Climate change perception in the energy sector

A comparative study of Norway and Germany

Marie Byskov Lindberg

Master thesis in Sociology

Department of Sociology and Human Geography

University of Oslo

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Summary

The thesis investigates perceptions of climate change (CC) among stakeholders within Norwegian and German energy sector, and the implications of climate perception for personal behaviour. The main focus of investigation is to examine how climate change is perceived in all its aspects: causes, consequences, measures, policies and the role of the individual confronted with its challenges. The background is to examine how the increasingly dramatised threat of climate change is received and treated by individuals who are daily employed with energy issues, as the energy sector represents one of the major challenges when it comes to solving the problem of climate change. Energy production based on fossil fuels is one of the major contributors to green house gas (GHG) emissions in the developed and newly developing countries, where 70% of the CO_2 emissions emerge by the production and consumption of energy. Based on one of the core assumptions of institutional theory, which claims that institutions affect policy and hence the flow of history, the climate perceptions among these respondents may be a neglected factor in the account for the main obstacles to a transition of the current energy systems in Norway and Germany from a fossil-fuel based into a renewable one.

The thesis' major theoretical approach is explanation-based theory, which emphasises the importance of studying (and comparing) cases within a context. A sample of twenty experts from public and private energy institutions in Norway and Germany was used as a case study. The public institutions present in the thesis are some of the central institutions within the energy sector in both countries. Their areas of responsibility reach from electricity production, power grids, and renewable energy to petroleum production. The private institutions are large scale energy companies involved in electricity and petroleum production.

Qualitative interviews are used as the primary research method. A comprehensive literature review of official documents and previous research on the energy sector in Norway and Germany was nevertheless necessary to create a contextual background against which the empirical findings are analysed. In order to maintain the claim of full anonymity with respect to person and institution, the findings are analysed according to three *groups* of institutions. The first group consists of institutions that are primarily occupied with conventional energy – here defined as not (new) renewable energy – production, analysis and politics etc; the second includes institutions whose focus is more on renewable energy and climate policy. To simplify, I called them the public/energy group and the public/environment group. The private companies made up the last group; i.e. the private group.

The findings reveal that there are major disparities among the respondents' climate and energy perceptions, and that group (and sector) belonging is more important for the interviewees' CC perception and behaviour than their nationality. The public/energy group is mainly constituted of individuals that are sceptical about climate change and critical towards the official climate policies. They do not regard it as a personal responsibility to reduce GHG emissions individually, and have hence not undertaken measures to do so in their private lives. Contrary to the public/energy group, the public/environmental group reflects the outspoken political agenda and expresses confidence in the reports from the international panel on climate change (IPCC). The respondents in this group also stress the individual's potential for action, and detail about their personal efforts to become more climate friendly. The private group interviewees are all clear that they regard the threat of climate change as real, but they are not as idealistic as the environmental group when it comes to undertake measures in their private lives.

Even though the sample is too small to be generalised, the findings imply that the public/energy group may represent an obstacle for the implementation of major emission reduction measures in Norway and Germany. The fact that the public/energy and private group hold diverging climate perceptions opposes previous research that account for the historical inter-linkages between the two groups. This may be explained with the role of business and industry in the climate negotiations. Other studies have shown that private actors turned from being climate sceptical and lobbying against the creation of binding negotiations into being pro-climate after the signing of the Kyoto protocol. Another explanation can nevertheless be that the respondents from the public/energy group are the persons with the most knowledge about the actual potentials for energy saving, efficiency and development of renewable energy in Norway and Germany. Faced with the enormous challenge of reducing GHG emissions in our highly energy dependent societies, this may make them conclude that the task is infeasible and hence lead towards a denial of the anticipated climate crisis.

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List of abbreviations

Btu	British thermal units
BUND	*Bund für Umwelt und Naturschutz Deutschland*
BINGO	business and industry non-Governmental organisation
BM	*Bundesministerium* (German Federal Government)
BMU	*Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit* (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)
BMWi	*Bundesministerium für Wirtschaft und Technologie* (Federal Ministry of Economics and Technology)
CCS	Carbon capture and storage
CDM	Clean Development Mechanism
CEO	Chief executive officer
CO_2	carbon dioxide
CO_2e	CO_2-equivalent
COP	Conference of the Parties
CSR	Corporate Social Responsibility
EdF	*Électricité de France*
EEG	*Erneuerbare Energien Gesetz* (the Renewable Energy Sources Act)
EIA	Energy Information Administration
EnBW	*Energie Baden-Württemberg*
ETS	Emission Trading Scheme
EU	European Union
EUR	Euro
GDP	Gross Domestic Product
GDR	German Democratic Republic
GHG	greenhouse gases
GT	Grounded theory
HEW	*Die Hamburgische Electricitäts-Werke AG*
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change

ISI	*Fraunhofer Insitut für System und Innovationsforschung* (The Fraunhofer Institute for Systems and Innovation Research)
JI	Joint Implementation
LRF	Local Research Frontier
Mt	million tonnes
Mtoe	million tonnes of oil equivalent
NABU	*Naturschutzbund Deutschland*
NGO	non-Governmental organisation
NOK	*Norske kroner* (Norwegian kroner)
NRW	*Nordrhein-Westfalen* (North Rhine-Westphalia)
NU	*Natur og Ungdom* (Nature and Youth)
NVE	*Norges vassdrag- og energidirektorat* (Norwegian Water Resources and Energy Directorate)
OECD	Organisation for Economic Co-operation and Development
ppm	parts per million
PR	public relations
PV	photovoltaic
RES	renewable energy sources
RWE	*Rheinisch-Westfälisches Elektrizitätswerk AG*
SDFI	*Statens direkte økonomiske engasjement* (The state's direct financial interest)
SFT	*Statens forurensingstilsyn* (Norwegian Pollution Control Authority)
SO_2	sulphide dioxide
TWh	terrawatt-hour
UBA	*Umweltbundesamt* (Federal Environment Agency)
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
WBCSD	World Business Council for Sustainable Development
WWF	World Wildlife Fund for Nature

1 Introduction

The public debate about global warming originated as early in the 1970's as a result of the scientifically observed temperature increases, which were proportional with increased levels of greenhouse gases in the atmosphere, above all CO_2. During the last couple of years, the focus on climate change has increased remarkably. Parallel with changing weather and climate patterns all over the world – and enhanced possibilities to spread the news about these within a few seconds due to improved communication technologies – the scientific community has sharpened their warnings about the possible effects of continued and/or increased emission of green house gases (GHG) into the atmosphere. As a consequence, climate policy and international climate negotiations have grown into a comprehensive policy area, with the signing and ratification of the Kyoto protocol in 2005 as an important watershed.

Even though the established scientific community – which bases its definition of scientific knowledge on the procedure of peer-reviewing – has stated that climate change (CC) is caused by human activity with 95% certainty (IPCC 2007a), there is still widespread discussion around whether climate change is "really" man-made or not and to what degree we will be able to stop it through changed behaviour. Disagreement and uncertainty within science is nothing particular for the case of climate change. Science always operates under certain degrees of uncertainty. For the case of CC, this uncertainty nevertheless becomes very evident as the stakes are very high. *If* the scientists are right, the implications for nature and people will be immense. The need for action would be urgent. The topic also provokes emotional reactions, as it concerns so many aspects of our society and our way of life.

CC is a consequence of many different factors, including fossil fuel based energy production, agriculture, de-forestation, waste, and overpopulation. The challenges are hence of scientific as well as of political, social and economic character. I have chosen to take a closer look at climate perceptions of persons within the energy sector. This choice was made of the following reasons:

1) Energy production based on fossil fuels is one of the major contributors to GHG emissions. In developed and newly developing countries, 70% of the CO_2 emissions emerge by the production and consumption of energy. Schreyer & Mez argue that "it is evident that climate and energy policy are two sides of the same coin" (Schreyer & Mez 2008:20).

2) The projections from energy agencies (IEA 2006) on future energy demand predict an enormous growth in energy production and consumption within the next fifty years. The amount of GHG emissions from the energy sector represents a major challenge for the future.
3) The potential for renewable energy production and energy efficiency is a controversial topic, and the development of alternative non-fossil fuel based energy sources relies heavily on political action and perceptions.

Norway and Germany are among the industrial countries that have signed and ratified the Kyoto protocol, and hence responded to the challenges of climate change with official policies directed towards decreasing their GHG emissions.[1] Their strategies for reaching their aims of emission reductions are nevertheless different, for several reasons. Above of all, they have very differently structured energy sectors, partly as a result of notable geographical differences. The sources of GHG emissions are correspondingly diverging. Even though Norway is granted with huge renewable energy resources, it will not reach its Kyoto aim in terms of domestic emission reduction, mainly because of the country's petroleum production. The Norwegian Government has nevertheless promised to reduce the emissions by more than 10% of its initial Kyoto obligations through financing reduction measures in developing countries.[2] Germany is one of few Annex I countries in the Kyoto protocol that – with high probability – will achieve its proscribed target through domestic measures by 2012. This is to a large degree a result of the reorganisation of industry and energy production in what used to be the German Democratic Republic (East Germany). Germany is also obliged to meet the European Union's (EU) directive on renewable energy, which prescribes specific national aims for the development of renewable energy sources (RES) and energy efficiency. The RES sector is a major focus of the German authorities, and Germany has outspoken aims of becoming a world leading exporter of renewable energy and environmental technology.[3] This has resulted in installation of new renewable energy production at a much higher rate than Norway during the last ten years. Norway's focus has been on becoming an exporter of technology for capturing and sequestering CO_2, and on donating money to save rainforest in other parts of the world.

[1] The industrial countries are in the Kyoto agreement classified as Annex I parties that have obliged themselves to binding emission reduction targets (UNFCCC 2008)
[2] Emission reduction in developing countries is in the Kyoto protocol organised through the Clean Development Mechanism (UNFCCC 2008).
[3] See for example http://www.german-renewable-energy.com/ (10.10.2008)

1.1 Climate change in a "fossilistic" age

The German economist Altvater (2005) has termed the industrial age as a "fossilistic" one, because of its dependence on the combustion of fossil and non-renewable fuels; coal, oil and gas. According to Altvater, the current political and economical systems in the Western part of the world are based on – and only possible through – large-scale energy consumption. To denominate the age we live in from the main energy source may be controversial. Such a concept nevertheless illustrates the immense importance of a country's energy structure – access, security and production, and that the energy structure is closely tied to the societal structure as such. The increasing consumption and dependence on fossil energy sources during the last 30 years may serve to confirm Altvater's assumption (Scheer 2005).

Correspondingly to the way Altvater links the combustion of fossil fuels to our political system, Sejersted (1999) perceives technology development as a political choice. He states that

> politics can and should be analysed at several levels. One perspective is to examine the existing institutional system and the possibilities within this system in a short time period. Another is to take a critical look at the system itself and the possibilities for changing it in a long term.

A common perception in modern societies is that technology develops autonomously and that societies have to adjust to the technological development. This implies that social actors do not have much choice. However, recent studies of technology show that the technological development is not autonomous, but in several ways "social constructed" (Sejersted 1999:10-11). Beck & Perrow (1995:122) argue that it is impossible to know in advance how modern complicated technological systems work. As a consequence, the development of some of these systems has to be carried through as full scale large experiments. According to Sejersted, the North Sea turned into such a large laboratory since the early 1970s, where new technology was developed through trying and failing (Sejersted 1999:22). Germany's development of renewable energy is also a consequence of successful policy measures (Bechberger & Reiche 2006). These examples indicate how essential and powerful policy measures are.

This implies that social and political relations play an important role in the field of technological development. The political impact can be through several channels. One is direct research funding. Another is the design of relevant laws and rules. Because of the influence political institutions have on the actual policy, March & Olson argue that the institutions are not only executors of a prescribed policy, but they have a certain degree of

autonomy in their policy making (March & Olson 1989). This means that beliefs, norms and rules within certain institutions are important for the construction of policy. Because of the role of institutions, this thesis investigates the perception of CC among leaders within some of the energy sector's central institutions in Norway and Germany.

To what extent it is feasible to transform the "fossilistic" age into a renewable one is impossible to forecast, as every energy scenario is nothing but a hypothesis. No one is able to estimate the potential or cost of traditional or renewable energies in 2025 or 2040 (Scheer 2005:54). In my opinion, this makes it even more interesting to take a closer look on how the problem and challenges are perceived. The Thomas' theorem states that if men define situations as real, they are real *in their consequences* (Collins 1994:199). This implies that if the barriers to mitigating climate change and a shift in energy system are perceived as impossible to overcome, they will remain so.

1.2 Research questions

1. *How do leaders within Norwegian and German energy sector perceive climate change – the threat, the debate and the policy?*

2. *What are the impacts of climate perception for personal behaviour?*

The background for why I have chosen to focus on the energy sector is, as mentioned above, the significance of energy production and consumption in climate policy. The main objective of research question 1 is to investigate how leaders within energy sector institutions perceive the issue of CC in a broad perspective, including the possibility and necessity for a change in their country's energy situation. I am interested in the perceptions, because perceptions influence how actors behave in different situations. If there is a belief that climate change is a large problem and that our behaviour matters, this might lead to a change in behaviour towards increased consciousness around energy use and GHG emissions. Research question 2 endeavours at investigating how climate perception influences behaviour. The gathering of data is accomplished through qualitative interviews with leaders from private and public institutions within the energy sector. Since I will not be able to conduct observational studies, the information about the respondents' behaviour is based on their own accounts given in the interviews. Because of the thesis' comparative approach, research question 1 and 2 implies the following subsidiary goals:

a) the comparison of Norway and Germany
b) the comparison of public and private energy institutions

The comparison of two countries requires an extended account for the situation of the two countries energy and climate policies. I will analyse the responses against the background of the official energy policies in the respective countries. The choice to carry through a comparative analysis between Norway and Germany is made because both countries have met the climate challenge with offensive policies and strive to play an active role in the establishment of a new climate agreement for the post-Kyoto period. Even though their present per capita GHG emissions are fairly equal, their energy situations are very different, and so is their sectoral potential for emission reductions. It is striking that Germany has introduced a more ambitious climate policy than Norway. Both countries are nevertheless far from a transition into a renewable energy age. The comparison is also made because I was curious to see whether the differences in national policies are reflected in the interviewees' perception of the topic. Research questions 1 and 2 have hence an individual as well as a contextual dimension.

After the field work was accomplished, I saw the need for establishing an additional research question:

3. *What are the historical relationships between public and private actors within the energy sector in Norway and Germany?*

The object of investigation is here the interaction between public and private institutions within the energy sector since the sector's origin. The analysis is focused on the role of the state in the development of the energy sector. As stated earlier in the introduction, abatement of GHG emissions will most probably depend on a reorganisation of the energy sector. In line with this assumption, research question 3 also serves to shed light on the role of politics in technology development. A historical review of Norway and Germany's energy sectors further serves to establish a context within which the empirical findings will be analysed. This corresponds with one of the core assumptions of explanation-based theory, which emphasises the importance of studying and comparing social regularities within a context (see chapter 2). Research question 3 represents a macro level focus, and the analysis is carried out on the basis of literary sources, in contrast to the previous two research questions which are based on empirical findings from qualitative interviews.

1.3 Confining the topic

A country's energy policy is a vast field, and it is impossible to cover all of it. It ranges from power production, supply, consumption and activities in the petroleum sector to coal mining and fuel provision for transport means. This thesis' empirical part concentrates on actors operating in the electricity and petroleum sector. The companies from the private sector are companies above all engaged in electricity production. The public sector institutions represented in the sample are a more mixed bag. They do not exclusively work with topics related to electricity supply; there are also representatives from fossil fuel research or administrative institutions. The representatives from public sector work with climate policy, electricity provision, petroleum production and energy policy in general.
In order to establish a context for the comparative analysis of the empirical findings, I have chosen to give a general account of both countries' energy and climate policies, I would like to stress that this part serves as a contextual background and is not an exhaustive account for the topic. This is also the case for the historical review of and public-private inter-linkages within Norwegian and German energy sector. I do not aim at giving a detailed account for the political and legal processes behind the energy sector development. The objective is to present an overview of the main tendency in both countries.

Neither will I give an account for the potential of different renewable energy sources and their development. Many authors have written about this topic.[4] Such an account would have served to illustrate the huge disparities and uncertainties in the prognoses.

1.4 Structure of thesis

In this introductory chapter I have presented the research topic and linked the problem of CC to the organisation of our current energy system. I emphasise why the energy sector is important when it comes to reducing GHG emissions, which serves to justify my choice of research question, sample and methodology. In the second chapter I will present the theoretical positions that are drawn on during the thesis, of which the explanation-based approach is the most fundamental. Contributions from institutional and rational choice theory serve to explain different aspects of the main empirical findings. The third chapter accounts for the choice of method applied in this thesis, my fieldwork and methodological limitations. Chapter four and five build the macro part of the thesis and create a contextual background against which the empirical results are analysed. In chapter four, I give a short introduction to

[4] See for example Hennicke & Fischedick (2007), Schreyer & Mez (2008) and Fornybar energi (2007).

the two countries present in the study, and I also present the predicted consequences of CC for each country according to the InterGovernmental Panel on Climate Change (IPCC). This is followed by an account for the present climate and energy policies in Norway and Germany. The fifth chapter investigates the inter-linkages between public and private institutions within the energy sector. In chapter six the empirical findings are presented and organised into three groups of analysis. In chapter seven I discuss possible explanations for the empirical results, and some of the explanations are linked to the findings from the macro part. Finally in the eighth chapter I account for the main findings of the thesis.

2 Theory

In this chapter, I account for the basic principles of the main theoretical positions in this thesis. Explanation-based theory makes out the basis theoretical framework around which the thesis' research design is constructed. This includes a presentation of previous research relevant for this thesis research questions, the so-called *local research frontier*. I also give an account of institutional theory and rational choice theory, as they contribute with additional explanatory factors made use of in the discussion part.

2.1 Explanation-based theory

This thesis starts out taking the position of an explanation-based notion of theory to analyse and categorise its empirical findings. Mjøset (2004) writes about such theory:

> By explanation-based theory we refer to a cluster of notions that conceives theory as knowledge accumulated from the explanation of specific cases. These notions all fit the contextualist attitude: there is no objection to generalization, but explanation-based theories generalize without loss of context and with explicit reference to research questions reflecting participation in society. This is different from pure induction from passive, non-communicative observation. The term explanation here does not refer to the natural science ideal of explanation by laws, but rather to explanation as a conjunction of specific factors, as conceived in the models of historical, narrative explanations.

Explanation-based theory is thus not one unified theory that one wants to "use" or "test" in the scientific work, in contrast to the various high level top-down notions of theory that are modelled on either natural science or social philosophy, which aims at developing a generalised model or perspective of social reality. Because the latter are based on top-down deductions, such high level theories are often weak when it comes to explanation. Explanation-based theories are less ambitious about the construction of overall social theory. Instead, it draws on previous research on similar cases, also known as *the local research frontier* (see below). As is the case for all theory, explanation-based theory is closely related to methods of *developing knowledge about social phenomena and social fields.* Ragin (1992) describes the appropriate method as a back and forth process between earlier theories relevant to the research question, referred to as *frames*, and new *images* that the new findings discover. "To the extent images lead to new frames, new theory is established" (Mjøset 2004). One of the most famous examples of explanation-based theory is Grounded Theory (GT). The notion of GT was developed by Glaser and Strauss from the Chicago school that flourished in the US in the 1920s and 1930s. Ethno-methodology and network theory are other conceptions that fit

the notion of explanation-based theory. Behind the idea of GT lies the presumption that one has to study and understand social life in its context. No social fact makes any sense abstracted from its context in social (and often geographic) space and social time. Social facts are located (Abbott 1997). Thus, individuals have to be observed, treated and analysed as actors in social relations. Social structures are regarded as a "set of temporary stabilities in process of flux and reciprocal determination" (Abbott 1997:1158). They are not something fixed and unchangeable, and must therefore be seen in light of their contemporary time and location. This again implies that 1) in contrast to a natural science ideal of theory development, experiment is impossible and 2) in contrast to a social philosophical ideal of theory, where generalisation of social facts over time and space is only possible to a very limited degree. Whereas the first notion of theory is oriented towards the need to model on the basis of given assumptions and the latter is driven by its wish/need to develop so called grand theory, GT is rather *problem-oriented.* One starts out with a problem with social and/or political relevance and *explores* reality by going out in the field and proceeds to enhance as much information relevant for the research problem and all involved parts. Before or during the field studies, one relates to different local research frontiers to get an overview as comprehensive as possible of different aspects of the field, accumulated by previous research. One nevertheless keeps the exploring attitude, as advocates for GT argue that only by starting out with such an attitude we are able to learn something new (Mjøset 2004). Empirical findings are then used to *develop new terms* – which is the basis for new theory. It would nevertheless not be correct to claim that I have conducted a grounded theory study. This would need a far more comprehensive field work where I spend more time with the interviewees, not only talking to them but observing the setting in which they are operating. It would not be possible within the frames of this thesis, but as a further work it would be interesting for future research to broaden the scope on societal aspects of energy use and strategies for mitigation and adaptation to climate change.

2.1.1 The local research frontier (LRF)

A critique that has been raised against grounded theory and explanatory-based theory is that it prescribes that the researcher starts out his field studies with a blank and unbiased attitude, which is considered an illusion. (Mjøset 2007:348) This is a false understanding of what its adherents strive at. Instead of basing their work on a constructed high-level theory based on a set of given assumptions/corollaries, explanatory-based studies define their problem formulations on earlier and related research within the same field. Mjøset (2007:349) terms

this the local research frontier. The LRF emerges as many researches ask the same research questions with reference to similar sets of data and other empirical investigation. In this respect, LRF synthesize existing analyses from research on many cases (Mjøset forthcoming). To be able to conduct an analysis as innovative and true as possible, the researcher needs to trace the frontiers relevant for her study. My study touched upon several fields and relates to several LRFs. As known to me, there are no other studies that have investigated perception of climate change among leaders within a sector directly connected to climate change. In this respect, I started out on bare ground. I will now give a short presentation of the findings from other researches working on similar research problems, accumulated within different disciplines: psychology, history, sociology, political science and others. The need for narrowing my research question and subsequent analysis led to the choice of relating my work to two LRFs in particular:

1) The frontier concerning lay people's perception of CC, which consists mainly of contributions from sociology and psychology.
2) The study of actors within the public-private energy (and to a certain degree environmental) bureaucracy. This frontier rests mainly on contributions from political science, sociology and journalistic work.

Other frontiers that could have been interesting to scrutinize more in depth are among others 3) the role and occurrence of expert knowledge, advocated within the tradition of sociology of professions, 4) the frontier occupied with "varieties of capitalism", i.e. the comparison of political systems in the countries present in my case study, and 5) the tradition drawing on findings from social psychology mainly aimed at studying phenomena concerning group influence/pressure, influence from the media, techniques to manage contradictory information etc.[5]

The research on perception of CC is manifold and increasing. Many researchers have been occupied with how the problem and threat of CC is received and interpreted in the population. Most of this research aims at investigating lay people's perception of CC. Norgaard is an environmental sociologist that has conducted a study on perception of CC in a small Norwegian city based on field studies during 2000 and 2001. Her main finding is that even though people were aware of the causes of global warming they chose to ignore it. She argues that her findings presents evidence that nonattention to CC in her case study was a matter of denial, and identifies this denial as a socially organized process (Norgaard 2006).

[5] I do not have the capacity to elaborate more detailed on this local frontiers, but acknowledge that it could be interesting to relate further research on the topic to them.

Norgaard identifies the most frequent arguments justifying nonattention given by her interviewees as "perspectival selectivity", a term established by Rosenberg (1991). It refers to "the angle of vision that one brings to bear on certain events" (1991:134). The perspectival selectivity was used to minimize Norwegian responsibility for CC, and hence to create what Opotow & Weiss (2000) call "denial of self-involvement".

Sørensen [6] has interviewed both lay people and scientists in Norway about their view on climate change. One of their main findings was that lack in political will leads to climate scepticism in the population. They found that the general attitude among non-experts is that they do not believe climate change can be that dangerous as predicted from the climate researchers, because if it really was that dangerous, the politicians would have taken action and done something about it.

Weber (2008) has carried through both qualitative focus interviews and quantitative analyses of statistical surveys to examine perception of climate change in the German population. Her work reveals that lay people describe CC as one of the most important environmental problem, which they worry about. At the same time, they do not experience it as a personal risk or threat, as they do not believe CC will have direct consequences for themselves. For the German population, CC is still too far away – in space and time – to trigger personal worry. The Germans argue that they are not threatened by CC themselves, in contrast to the poor population in developing countries. Nature and wildlife is also perceived as threatened which does not have consequences for a largely urbanised German population. Weber argues that the perception of CC among her respondents reflects the media debate and the medial description of the problem. Another important finding is that the so-called climate sceptisists' arguments do not find support among lay Germans. Even though the Germans see the necessity of acting in order to reduce GHG emissions, they are not ready to undertake substantial measures themselves as long as a "third part", i.e. fellow citizens, industry, other countries, remains passive. In this respect, they perceive institutional actors as the Government and the industry as responsible for solving the problem (Weber 2008:235-237). Weber's qualitative research suggests that CC is perceived as a far-reaching crisis, but not handled as such. This corresponds to Sørensen's findings of Norwegian climate perception: The problem is not dealt with as one would expect the dealing with a comprehensive societal crisis.

[6] There is no publication from Sørensen's project available yet. Information from a fact sheet from the Norwegian Research Council: http://www.forskningsradet.no/NORKLIMA (21.09.2008)

Even though the study of perception of climate change among experts in the energy sector is poorly investigated, the study of interaction within and between the institutions present in my thesis is a beloved object of political scientists, sociologists, historians and others. This research area constitutes in this respect a local research frontier in a broader sense. I will account more detailed for this LRF in chapter 5. Several contributions to this LRF relate their work to Institutional theory. I will now give a brief introduction to the main principles of historical-institutional theory, and also give examples of other studies on environmental policy that endorse its assumptions.

2.2 Institutional Theory

Institutional theory is a theoretical tradition within both political science and sociology – as far as it makes sense to draw a distinction between those two disciplines. Institutional theories stress the importance of institutions within the making of politics as they see politics as conspicuously influenced by the institutional structures within which politics occur (March & Olsen 1989).The classical sociologists were occupied with the nature of institutions in modern society from the beginning. Weber wrote extensively on bureaucracy (see for example Weber 1990). In his view, the ideal-type of rational-legal bureaucracy is a distinctive feature that characterises the development of western societies compared to previous civilisations. Weber posited a direct link between cultural values and formal structures in society, including formal institutions. One of Weber's observations regarding the bureaucracy was its permanent character: "An accomplished bureaucracy belongs to the kind of social structures that are most difficult to destroy" (Weber 1990:141). According to Weber, the bureaucracy – defined as the system of formal public institutions to execute the tasks of the national state – is build upon the principles of purposive rationality (*Zweckrationalität*). In other words, the bureaucracy is an institutionalisation of this type of rationality. He nevertheless does not deny the informal features existent in every organisation, but it is not in his interest and purpose to investigate them. Rather, he aims at pointing out the *main characteristics* of modernity's bureaucracy (Fivelsdal 1990:x). This can explain why bureaucracies tend to be forces for conservatism in different policy areas. Durkheim referred to sociology as the "science of institutions" (Peters 2004:110). His analysis focused more on how objective societal facts were converted into symbolic systems that represented collective values for institutions. Selznick was interested as much in the process of institutionalisation as in the institutions that result from that process (Peters 2005:110). His work and the work of his students reinforced the point that institutions have a capacity to defend their core values. They also emphasised

the importance of maintaining routines and processes in the face of the challenges that confront any organization or institution.

Political science's institutional theory rests to a large degree on sociological tradition. Even though the roots of political science are in the study of institutions, institutional theory was largely neglected by the discipline's scholars from the 1950s until the beginning of the 1980s when "new institutionalism" came into existence. Among the most important scholars within new institutionalism were March and Olsen, who named the movement (Peters 2005:16). The re-emergence of institutionalism in political science was to a large degree a reaction to the increasing rationalisation and individualisation of the discipline's theoretical perspectives, dominated by rational choice theory (see chapter 2.3) and social psychology. The focus of analysis had been on the input to Governments and on the distributive effects of Governmental actors. Institutional relations and governance itself was not regarded as an important factor and hence not offered much attention (Skocpol 1985). The renewed attention to institutions represented a shift in research object. Focus moved from a particular decision process to the institutional establishments that give these processes meaning (Olsen 1989:30). By taking on an institutional approach, one regards institutions as arenas for contending social forces, and as collections of standard operating procedures and structures that define and defend values, norms, interests, identities and beliefs. (March & Olsen 1989:21-6) This rests on an assumption that institutions often can be analysed as a collective acting coherently, which makes it possible to treat institutions as political actors. The approach also presumes that institutionally determined patterns of thinking and acting are more typical for political life than rational decisions. According to institutional theory:

> … political actors are driven by institutional duties and roles as well as, or instead of, by calculated interest; politics is organized around the construction and interpretations of meaning as well as, or instead of, the making of choices; routines, rules and forms evolve through history-dependent processes that do not reliably and quickly reach unique equilibria; the institutions of politics are not simple echoes of social forces; and the polity is something different from, or more than, an arena for competition among rival interests. In short, the organization of political life makes a difference, and institutions affect the flow of history (March & Olson 1989:159).

The institutional perspective is not a uniform theory (Peters 2005, Reitan 1998:18). It nevertheless bases on the definition of institutions as consisting of cognitive, normative and regulative structures and activities that provide stability and meaning to social behaviour (Scott 1995:33). Advocates of institutional theory point to a degree of institutional autonomy

which is necessary to establish that political institutions are more than mirrors of social forces (March & Olsen 1989:18).

The most important division within institutional theory is above all that between rational institutionalism on the one hand and new-institutionalism on the other. The former emphasises the institutional framework and the fact that laws, rules and norms define the actors' scope of behaviour. This perspective presumes that institutions modify behaviour through rules and formal structures *without* changing basic values and interests. The latter claims that the institutions develop moral and cognitive structures. They therefore also shape and change actors' values and world-views. New-institutionalist theorists also argue that institutions influence behaviour as they constitute terms and categories in which individuals interpret reality (Reitan 1998:20). New institutionalism argue that actors within institutions are socialised to follow the "logic of appropriateness", and into acting in ways which are consistent with the overall objective and culture of the institution. When facing a set of action possibilities, the actors evaluate 1) what type of situation they are facing, 2) what are their main identity in the situation and 3) what kind of behaviour is expected from me or the institution I represent in this situation? The final action choice is decided by one's perception of the institution's rules and norms about the correct action appropriate for one's identity and task in the given situation (March & Olsen 1998:21-6).

The sociologists DiMaggio and Powell can also be placed in the new-institutionalist tradition. They have nevertheless criticised the political scientists for putting too much emphasis on identification and internalisation (DiMaggio & Powell 1991:15) Instead, they argue that the institutions' cognitive aspects are decisive for individuals' and organisations' perception of reality. In this respect, their contribution largely draws on the social constructivist tradition (Reitan 1998:19; Peters 2005:113). I am uncertain whether their point of view really differs from the one advocated by March & Olsen, except for that they simply put more weight on how the members of an institution perceive situations within their structure. Most important is that the new-institutionalists' accounts of institutions are in direct opposition to the rationalistic roots of rational choice theory (Peters 2005:121).

Previous research relevant for this thesis that stands in the institutional tradition is among others Reitan's study on Norwegian environmental policy during the 1980s (pollution policy) and 1990s (climate policy). Confining the analysis entity to the political and administrative system of governance, she investigated how institutional features influences policy making. Some of her findings and can be seen as evidence for the new-institutional

perspective as she argues that cognitive structures within institutions are important to understand policy making in her cases (Reitan 1998:21).

Another study that implicates the relevance of institutional theory for the energy sector is Jelstad's study of corporate social responsibility (CSR) in Statoil. One of her findings is that the environmental strategy within the firm partly is a result of internal values and norms around social responsibility that to a large degree reflects national (Norwegian) norms and values. Jelstad argues that the company's environmental strategy is above all a consequence of formal demands from Norwegian authorities, but internal pressure was also a factor that gradually made the Executive Board change its attitude (Jelstad 2005:76). The importance of the institution's internal culture for the development of a CSR strategy stands in line with the assumptions of new institutionalism.

2.2.1 The theory of the segmented state[7]

Research that aligns with the institutional tradition has revealed that the design of public policy is much more than formal resolutions. Decision makers rarely possess a full account of all possible alternatives for action, their consequences, the connection between the consequences and different aims. What aims will be prioritised is to a high degree influenced by the existence of appropriate measures. The design of measures depends both on where different institutions seek information as well as on who are offering information and solutions to the problems (Olsen 1978:37). The scope of action and choice is not solely connected to the Parliament. Sometimes, interest organisations are given authority for decision making. In an increasing number of domains and cases, the public administration influence policy. The reason is that it matters how regulations, rules and decisions are worked out (Olsen 1978:38).

Segmentation rests on an assumption that politicians, administrative actors and interest organisations within different sectors constitute systems for decision making. The most important distinctions in politics will be between different fields of cases, around which a *segment* emerges (Reitan 1998:25). A segment may for example be organised around a specific type of industry policy or around functions such as health services, transport or energy. Members of each segment belong to different institutions, and there is not necessarily agreement within each segment. The members nevertheless share basic values and

[7] The theory of the segmented state is developed on the basis of an analysis of Norwegian conditions. Its counterparts in the international literature are theories on policy network and policy communities (see for example Smith (1993). I have nevertheless chosen to give an account for the segmented state theory, as I consider it as applicable on the study of German circumstances as well.

perceptions. Interaction within a segment can be exemplified by a statement made by a state secretary in the Norwegian Ministry of Finance, stressing that the best way for organised interest groups to influence the Ministry is by influencing the motivations of the minister's leading advisors (*statssekretærer*) (Egeberg et al 1978:123). In line with such a description of the political system, important tasks will be to map out 1) the most important segments and what resources, measures and possibilities for sanction they posses 2) the network between segments and 3) the strength relationship between the segments (Egeberg et al 1978:124).

The methodological choice made in this thesis of confining the sample to members of the public administration and private companies can be justified with the assumptions of theory of segmented state. A perspective assuming a segmentation of public and private institutions can be fruitful to understand interaction between institutions in different sectors. Such a theory describes the political system as a collection of segments or areas for decision making (Egeberg et al 1978:122). A complete study of the energy segment would nevertheless require the inclusion of politically chosen members of the Parliament and Departments in the sample. This is not possible within the scope of this thesis.

2.3 Rational choice theory

The rational (also sometimes called utilitarian) tradition has its roots back to Jeremy Bentham and Adam Smith. It has above all been important within the discipline of economics, where it is still considered as the prevailing basic theory. Also within the sociological, political science and philosophical traditions, the theory usually known as rational choice has played a central role since the 1950s (Collins 1994:121). In the following, I will concentrate on the tradition's main contributions within political science.

Whereas institutional theory rests on the assumption that actors act according to a "logic of appropriateness", rational choice theory claim that individuals and institutions are rationally calculating actors. Instead of focusing on the institutional culture and the impact of social features on behaviour, the preferences of political actors are perceived as exogenous to the political process. They are shaped by forces beyond the concern of the immediate choice situation (Peters 2005:26). The focus of analysis is therefore to understand how actors are motivated to do what they do (Collins 1994:124). Simplified, members of the institution act in accordance with the option that brings the less possible costs and the highest possible utility, based on an estimation of costs and gains related to different choices.

One study that in a certain extent draws on the rational choice perspective is Vormedal's (2008) analysis of the role of business and industry in the climate negotiations.

Vormedal argues that private actors turned from being climate sceptical and lobbying against the creation of binding negotiations into being pro-climate after the signing of the Kyoto protocol. Her findings support the assumption that business and industry, represented by business and industry NGOs in the negotiations, are driven by rational considerations of what is the most profitable strategy in a market perspective (Vormedal 2008). This endorses the conception of private companies as rationally calculating actors.

3 Method

To be able to answer the primary research questions, this thesis makes use of a qualitative method for the gathering of empirical data. A qualitative approach is characterised by special attention to details and closeness to the informants (Thagaard 1998). This was important for me, in order to grasp as many aspects of the respondents' climate perceptions as possible. In addition, I conducted a considerable text analysis, in line with the explanation-based theoretical approach accounted for in chapter two. In the following section, I account for the methodological aspects connected to the thesis' empirical part.

3.1 Why interviews?

The qualitative research interview attempts to understand the world from the subjects' point of view, to unfold the meaning of peoples' experiences and uncover their lived world prior to scientific explanations (Kvale 1996:1). The qualitative interview was therefore a natural choice for the gathering of data about my topic, as I was aiming at grasping the interviewees' subjective opinion on CC. The issue of climate change is to a large degree the *risk* of climate change. Firstly because its major consequences will occur in the future. Secondly because of the uncertainties in the predictions. Beck (2007) points to the constructivist aspect of risks, and argues that the risks are a result of constructions and definitions and takes the form of a type of knowledge. The risks can hence be dramatised, modified and altered according to which norms that decides what is perceived as knowledge or not-knowlegde. In this regard, the risks are products of definition struggles (Beck 2007:66). Although scientists observe changed weather and temperature patterns all over the world, the major problems connected to global warming still takes form as anticipated risks located in the future. Even changing weather events have to be interpreted and placed in a climate context to be understood and perceived as a climate risk. This interpretation largely depends on expert or scientific knowledge. The risk is hence created and mediated through social discourse. A substantial part of the empirical work was to elaborate on the interviewees' risk perceptions of climate change.

The wish to investigate climate change perceptions originated from what I identify as two interdependent attitudes that I frequently observed both in the public debate and in personal discussions with colleagues and friends before I started the work with this thesis. The first attitude is the assumption that

A) “Most people” will not take action against CC as long as industry and authorities appear unwilling to undertake sufficient measures.

This attitude is among the findings of Sørensen’s study (see chapter 2). Weber (2008) also found the opinion among respondents in her focus group studies that “the state and industry actors have to take action first”. This attitude made me curious to study personal behaviour among representatives from policy and industry strata who work directly or indirectly with climate related topics in their professional life. The second attitude is the widespread position that

B) “What I do personally does not matter for the climate anyway”

This attitude represents a more general moral philosophical problem. In economic terms, it occurs because individuals do not have an incentive to act as their private cost of action is higher than their share of dispersed benefits. This results from the fact that climate is a ”global public good”: Nobody can be excluded from its effects and there is no rivalry in consumption. It is true that what every one of us does have microscopic consequences for climate change. If we as individuals save a few kilos CO_2 it is futile when the rest of the world continues with business-as-usual and the overall emissions keep increasing. Attitude B is nevertheless familiar with the problem outlined by Hardin (1968) in his famous article “Tragedy of the Commons”. Hardin describes how multiple individuals acting independently in their own self-interest can ultimately destroy a shared resource even where it is clear that it is not in anyone’s interest for this to happen. He argues that the problem has no technical solution, but “requires a fundamental extension in morality”.

To illustrate the importance of individual behaviour, Michaelis (2003) states that the fastest growing causes of environmental damage and resource use in industrialised countries are directly linked to households, lifestyles and consumption, and concludes that individuals play a significant role in turning our lifestyles into more sustainable ones. Hovden (2005) has on the other hand conducted field studies in West Norway where he finds that households with an outspoken environmental commitment do not necessarily have a lower energy and resource consumption. This is due to the fact that there are many things everybody has to do, like heating the house, showering, driving the children to nursery school and to work and so on. In addition, he found that the environmentalists more often went for holiday to exotic places, which implies large environmental impacts. Hovden argues that the environmentalists’ most important contribution to “environmental-friendliness” is their political support for structural changes and by accepting changed frame conditions in favour of increased environment protection. Most scenarios developed to explore the potential for a sustainable

future nevertheless conclude that a combination of technological and lifestyle changes will be required (Michaelis 2003). This makes implicates that the individual is not without responsibility and agency, even in a world where cause and effect of individual behaviour may be globalised and therefore invisible. Beck (2007) argues that global environmental problems are one of many side effects of the industry society that are contributing to "a meta transformation of society" in the 21st century. Many authors have requested a "new future oriented global ethics of responsibility" in response to this transition (Beck 2007:41). If the previous argumentation is accepted, it is obvious that attitude B is an example of the perspectival selectivity accounted for in chapter two. According to this mechanism, the individual chooses to take in a point of view convenient for her in the given situation.

3.1.1 Climate perception and behavioural intentions

When I say climate perception, I mean perceptions that regard all aspects of climate change perceptions touched upon in the interview. I hence understand both the perception of scientific prognoses, the assessment of climate policy and the perceptions' implication for personal responsibility and individual "climate" behaviour as part of the interviewees' climate perception.

It is important to stress the fact that I did not ask each respondent directly about his or her actual behaviour. My questions was formulated more generally and encouraging the interviewees to talk about how they integrated climate protection in their everyday lives. I also asked about behaviour in their social surroundings, and posed some questions regarding a different, hypothetical situation. O'Connor et al (1999) suggests the term *behavioural intention* as the allusions to engage in environmental friendly behaviour and support Governmental environmental initiatives. Ajzen & Fishbein (1980) (in Michaelis (2003)) offer substantial research evidence that behavioural intentions and actual behaviours are highly correlated.

3.1.2 Choice of sample

My sample consists of people who work within different institutions, whose work field is that of energy production or administration in Norway and Germany. I have chosen this sample for specific reasons:

1) Global warming is directly linked to energy consumption, because the major part of energy production in the world is based on combustion of fossil fuel (see chapter 1)

2) I am interested in how conscious people that work with energy in their professional life are about climate change.
3) The interviewees will be working closer to the decision processes concerning energy than most other people in the society. Some of them may even influence the making of policy directly or indirectly. In accordance with institutional theory (see chapter 2), experts within the political system develop and shape the understanding of policy issues and alternatives (Heclo 1974). Industry representatives often influence through lobby activity (see chapter 2 and 5).
4) I want to investigate how people that are aware of the problem of CC respond to it. Existing research assumes that a lack of information about the causes of global warming is the primary reason for the public's failure to respond (Norgaard 2006). By interviewing experts in the energy sector, I assume that the interviewees will be well informed on the topic. The focus may hence be on how the interviewees respond to information about CC instead of investigating whether they possess this information or not.

The sample consists of 20 persons, ten Norwegians and ten Germans. In Norway, there were five men and five women. In Germany, there were one woman and nine men. The public institutions represented in the sample are some of the central institutions within the energy sector in both countries. Their areas of responsibility reach from electricity production, power grids, and renewable energy to petroleum production. The private institutions are large scale, market dominating energy companies involved in electricity and petroleum production. I aimed at talking to people that were experts and held leading positions. The majority of the sample consists of leaders on intermediate level. Most of the interviewees are trained economists, but there are also engineers, geologists, political scientists and biologists represented in the sample.

To ensure the full anonymity of each interviewee, I will not give a list of which institutions that are represented in my study. To be able to analyse the empirical findings, I have decided to *group* the different institutions according to their *main area of activity and responsibility*. The public sector is divided in two groups. The first consists of institutions mainly occupied with what I call traditional energy, defined as fossil, nuclear and large scale hydro energy. The second group consists of institutions whose area of responsibility is also energy production, but directed towards the development of new renewable energy (RES), i.e.

renewable energy exclusive large scale hydropower.[8] To simplify, I call them the public/energy group and the public/environment group. The last group is called the private group and consists of the private energy companies whose core business activity is traditional energy production. The German energy companies are mainly hard coal, lignite and nuclear power energy producers, but they also have a minor share of RES in their production. The Norwegian energy companies are primarily producers of petroleum and hydropower. For the analysis, the interviewees are given fictitious names, but their gender is kept authentic.

Table 1: The distribution of interviewees

	NORWAY	GERMANY
PUBLIC/ENERGY GROUP	4 interviewees	3 interviewees
PUBLIC/ENVIRONMENT GROUP	3 interviewees	4 interviewees
PRIVATE GROUP	3 interviewees	3 interviewees

3.1.3 Getting access

The contact was established through e-mail, where I sent a description of the project and emphasised that participation was voluntary and would take place on an anonymous basis. If I had not received a response within a week, I followed up with a phone call. I tried to get people from as comparable positions and institutions in Norway and Germany as possible. In the private sector, it was more difficult for me to choose the interview objects myself. First of all, I did not have the overview over each company's organisation structure, and I could not always figure out who held which positions. Secondly, when the receiver in the company read my research description, my request was often forwarded to a person in the company who worked with climate policy or renewable energies. To ensure that the private sector was presented in my sample at all, I accepted this and made sure that I got employees with similar positions and work areas from all the companies. Even though the private group consists of companies whose main business activities are traditional energy, the majority of the interview objects in this group are occupied with climate and/or RES strategies. This may have implications for the findings, and further research on the topic would be necessary to confirm if the perception of the group is valid for the companies in general. The question of validity

[8] In order to separate large scale hydropower, which is a well-established commercial technology, from all other renewable energy technologies, the latter are denoted as "new renewable energy technologies". These are e.g.: solar energy – photovoltaics and solar collectors, bioenergy, windpower, salt power, tidal power and geothermal energy.

applies for all groups, because of the small size of the sample, and will be commented on below.

There was substantial difference in how difficult it was to get access between countries and sectors. In general, the private sector responded quite fast and we could easily make out an appointment. When it concerned the public sector, it was much easier for me to get access in Germany than in Norway. In Germany, I was allowed to speak to almost all the people I wanted to, except of one interviewee who was sick. In this case, I talked to her subordinate. The Norwegians were notably more sceptical towards participating in the research project. Some of the level two leaders I contacted either neglected to answer me at all, or they wrote back that they could or would not prioritise this in a manner that was strikingly impolite. I nevertheless managed either to talk to their subordinates or leaders of neighbouring departments, and I do not think this has influenced the comparability of the Norwegian and German sample. The Norwegians were also more concerned about the anonymity guarantee. Several of them emphasised either before or during the interview that this was an important condition for their participation and their ability to speak openly about the topic. The difference in openness between Norwegian and German bureaucracy may be related to my identity as a foreigner in Germany and as "just another master student bothering me again" in Norway. It could also be due to the fact that the Norwegian bureaucrats have experienced that their participation in earlier research has been misused – in their own opinion – and created negative attention around them or their institution. I doubt that the Norwegians are more pressured with work tasks, as one Norwegian bureaucrat used as excuse to refuse to see me. Even though I did not map out how much each interviewee works per week, it was clear that the Germans were working a lot, and that they had just managed to squeeze me into their full program to be able to talk to me.

Gender was not a criterion during my selection. It is a coincidence that the Norwegian sample consists of five men and five women, whereas I in Germany only had one female interviewee. The implication of the gender distribution for the thesis' results is reflected upon in the discussion chapter.

3.2 In the field

My fieldwork in Norway and Germany lasted from October 17, 2007 until February 13, 2008. The interviews were carried through in Norwegian and German, and transcribed in the original language. Some quotes were translated for the empirical chapter.

My interviews were semi-structured, and the interview guide was divided in three main parts. Semi structured interviews allow the researcher to be flexible and open towards other topics the informant might bring up, which the researcher otherwise would have missed (Thagaard 1998:81). They also open up for changing the order in which the questions are posed and I sometimes left questions out or added new ones when I thought it was necessary. The questions were organised around the following topics: perception of climate change and policy, strategy on the work place and the role of the individual. The last part of the interview guide hence addressed subjects such as personal worry, personal behaviour and individual responsibility. These questions could be interesting to analyse in a psychological perspective. My intention was nevertheless not to identify what (social-) psychological mechanisms which were active in the respondents' climate narratives. The reasons for including the personal dimension represented in the second research question were firstly to investigate how climate change has made its way into the private sphere, motivated by the two attitudes discussed in section 3.1. Secondly, I hoped that the questions addressing personal behaviour could shed additive light on the interviewees' CC perceptions.

3.2.1 What kind of knowledge is produced in the interview situation?

There is disagreement about what it is possible to obtain knowledge about through qualitative interviews. Some authors standing in the positivist tradition have argued that "interviews are essentially about ascertaining facts or beliefs out there in the world" Silverman 2001:90). Advocates of the emotionalist position argue that the main object of interviews is to elicit accounts of subjective experience. Because interviews are narratives of what happen or happened, the knowledge collected through interviews is a result of the interviewee's *understanding* of what happened (Thagaard 1998:79). The position of this thesis is somewhere between the positivist and the emotionalist, though more biased to the latter. As my primary research question aim at investigating perceptions it is clear that the respondents' understandings are of crucial importance to me. On the other hand I ask the respondents about actual strategies within their institutions and what their behaviour and consumption patterns actually look like. However, it is questionable whether they told the truth – and what they did not tell. Every account for actual behaviour is a loaded narrative.

Knowledge produced in the interview situation is further a result of the relationship between the respondents and the researcher. The researchers' position is important for what relation that emerges between the two, and hence for the outcome of the interview situation (Thagaard 1998:80). The role of the researcher during the interview and during the analysis

period may influence the study's outcome to a significant degree. Because of qualitative research' principle of mutual influence between researcher and interviewee, the researcher should clarify the conditions that characterise the research process (Thagaard 1998:17).

Widerberg (2001) emphasises the importance of "memory work" (*minnearbeid)* for the researcher in order to identify what knowledge, perceptions and prejudices she has before the interviews are carried through. To be able to meet the interviewees with an unbiased attitude, I worked on identifying my own relation to and perception of CC. With a background from the environmental movement, my starting point was naturally in the favour of the environmentalists' major opinion. I thus tried to inform myself as much as possible about pros and cons in the debate, to find out what are the different arguments, uncertainties and interests. This work was repeated several times during the process. I also contacted scientists at the Department of Geosciences at the University of Oslo and met with two researchers there in order to hear their opinion about the current climate debate. My objective in the thesis is nevertheless *not* to account for the different positions within debate on CC, and decide which one is the best. It is important to emphasise that I did not try to scrutinise whether the respondents were "correctly" informed or believing in the "right thing". I wanted to study the differences in perceptions, and I hence aimed at meeting the respondents with an as unbiased attitude as possible.

The interviews are certainly influenced by the fact that I as a student was meeting experts – many of them senior. In Germany, I had the additional disadvantage of not speaking my mother tongue. I nevertheless tried to prepare as carefully as possible before each meeting by informing myself about the topic of discussion and about their work institution as much as I could. I also carried out two pilot interviews, one in Norwegian and one in German language.

My personal assessment is that I managed to establish a confident setting between me and most of the interviewees. The majority of the interviewees opened themselves and spoke frankly about the topic. I even got the impression that some of the interviewees felt that they could relieve themselves to me and share their opinions around a topic which for some of them was seemingly an object for frustration.

3.3 Limitations

The scope of the research questions and my limited resources as master student represents several challenges. The largest disadvantage what concerns the empirical study is in my opinion the size of the sample, both in respect of the number of institutions and the number of

respondents from each institution. I only interviewed between 1-3 persons in each institution, out of a total of sixteen organisations – eight in Germany and eight in Norway. This has major implications for the generalisability of the empirical findings, as I am not able to prove whether my results hold for the institutions – and hence for the groups – in general. The fact that the interviewees are leaders may serve to support the assumption that their perceptions are valid for other parts of the organisation as well. However the research design was not developed in order to investigate climate change aspects within a specific organisation structure. Taking in an exploratory approach, my aim was to investigate perceptions of CC among energy sector employees, rather than to identify institutional cultures. The results presented later in the thesis nevertheless imply that organisation culture and institutional belonging is of significant importance for the employees' climate perceptions. This assumption is based on the comparison of institutions with similar business activities and work tasks. In order to confirm these assumption a more comprehensive study where both qualitative and quantitative methods are applied would be necessary.

4 Energy and Climate Policy

Norway and Germany differ largely in their energy politics. I will now explain each country's actual strategies in the energy policies. This is meant to give an overview of the status quo, not to be an historical account of the development in bargaining processes. To establish a picture of the context for the national policies, I will start out by giving a short presentation of key information about Norway and Germany in 4.1, including a brief account of the environmental movements and a list of anticipated consequences of climate change for each country. Subsequently in 4.2, I illustrate the actual challenges concerning a restructuring of energy demand and supply, by contrasting the foreseen future energy demand with the amount of GHG reduction according to IPCC.

4.1 National context overviews

Germany is a republic in Central Europe. It is a federal democracy, which consists of 16 *Bundesländer* (counties) and more than 12 000 *Gemeinde* (municipalities). Germany was among the founders of the European Union and is with its 82 million inhabitants the EU country with the largest population. Germany shares boarders with Poland, Czech Republic, Hungary, Austria, Switzerland, France, Luxembourg, Belgium, the Netherlands and Denmark. The climate is temperate. The country spreads over 357 104 km^2 and it has almost 2 400 km of coastline along the Baltic and North Sea. The population density is 230/km^2. 54% of the land is cultivated for agriculture purposes and 30% is covered by forest. The national currency is Euro (EUR). Its gross domestic product (GDP) counted 2 400 billion EUR in 2007; 40 USD per capita, and is the third largest national economy in the world, after USA and Japan. It is the world's leading exporting country, and the export surplus was 162 billion EUR in 2006. The unemployment rate is 9.0%.[9] The female employment rate is 62%, and 46% of these work part time (numbers from 2006).[10]

Norway is a monarchy in Northern Europe. It is since 1994 member of the European Economic Community, but has chosen to stay outside the European Union. Norway boarders Sweden, Finland and Russia, and is characterised by a long coastal line that counts more than 20 000 km. A population of 4.8 million people live in the country which spreads over 323 802 km^2. The population density is 14.73/km^2. Norway is divided in 19 *fylker* (counties) and 430 municipalities. Both levels are governed by democratically chosen bodies. The climate is

[9] http://www.pub.arbeitsamt.de/hst/services/statistik/000100/html/monat/200712.pdf (12.10.08)
[10] http://www.ssb.no/emner/00/minifakta/no/main_05.html (12.10.08)

temperate, above all due to the Gulf Stream, but the northern areas are dominated by more arctic conditions. The national currency is Norwegian kroner (NOK).[11] The Norwegian GDP counted 2 277 billion NOK in 2007; 83 USD per capita. Luxembourg is the only European country which exceeds the Norwegian GDP level when disparities between national price levels are corrected for.[12] In 2007, the export surplus was 365 billion NOK, 16% of total GDP. The unemployment rate is 2.8%.[13] Seven out of ten women are employed, of which 43% work part time (numbers from 2006).

4.1.1 Environmental movements

The German environmental movement as it is known today grew in the 1970s and 1980s. Roose identifies this as a result of two parallel factors. Firstly, the publishing of several books that addressed the problem of increasing pollution and resource use, above all "Limits to growth" (Meadows et al 1972) and "Silent spring" (Carsons 1962), and secondly, the construction of nuclear power stations in Germany. The latter was met with substantial resistance, and the environmental movement managed to delay and stop the construction of two planned for power stations. In no other European country is and was the environmental movement to such a degree dominated by the issue of nuclear energy as in Germany (Roose 2006:273). By the end of the 1990s, there were at least 9200 environmental organisations in Germany. The organisations are supported by ecological oriented research institutes. The Öko-Institut was the institute first established and it evolved in the wake of the nuclear power conflicts referred to above. During the last decades the support to the environmental organisations has increased. Between 1985 and 2003, the member numbers for the four largest organisations has tripled. In 2003, Greenpeace had about 550 000 members, BUND[14] and NABU[15] almost 400 000 members each and WWF 250 000 members (Roose 2006:274).

The emergence of the Norwegian environmental movement coincided largely with the development in Germany. In the late 1960s and early 1970s several environmental organisations were established. Environmentalism became a permanent political issue in Norwegian politics at the end of the 1970s (Grenstad et al 2006:32). Despite the prominent position of organisations in the Norwegian society, Grenstad et al argue that environmental organisations have failed to become broad popular movements and membership rates have

[11] The exchange rate as of 13.11.2008 was 1 EUR = 8.9 NOK
[12] http://www.ssb.no/regnskap/ (12.10.08)
[13] http://www.ssb.no/arbeid/main.shtml (12.10.08)
[14] *Bund für Umwelt und Naturschutz Deutschland*
[15] *Naturschutzbund Deutschland*

never been high. This is extraordinary in a country with an extensive voluntary sector (Sivesind et al 2002). Grenstad et al identify two reasons for this. One is that Norwegian Governmental bodies adapt environmental concerns early, making mobilisation more difficult and less necessary. Another explanation is connected to the current transformation of the voluntary sector and the fact that it in general has become much more difficult for politically based organisations to achieve high membership numbers (Grenstad et al 2006:33). The largest organisations are The Norwegian Society for the Conservation of Nature which counted almost 18 000 members, Future in Our Hands with more than 20 000 members and Nature and Youth (NU) – an environmental youth organisation (25 years age limit) – which counted around 6000 members in 2008.

4.1.2 Regional Climate Change

It is impossible to give an account of all impacts of climate change for Norway or Germany. Climate change is a global phenomenon, and climate change in other parts of the world will most likely have consequences for the situation in Europe as well through economic, political and social impacts. The last decades of intensifying globalization has also made us more vulnerable to such changes in other parts of the world. I will give a brief review of the possible consequences of climate change for the two countries in my thesis, based on the 4th assessment reports from the IPCC, working group II (IPCC 2007b). This was also one of the first questions in my interview guide, and aimed both at investigating what they had heard about the consequences of climate change for their own country, as at examining to what extend they considered the global threats as a threat for themselves and their country.

For Norway the anticipated consequences are the following:

- "More" weather: increased precipitation – which can lead to increased floodings, more wind, more and stronger storms
- Glaciers withdrawing or disappearing
- Sea level rise
- Increased productivity in the agricultural sector and forestry (longer growth period)
- new instabilities in geological conditions – more frequently avalanches, possibility of damage affecting infrastructure (including roads, power grids and pipelines)
- Changed conditions for flora and fauna – new species occur, traditional species may become extinct (Mathismoen 2007).

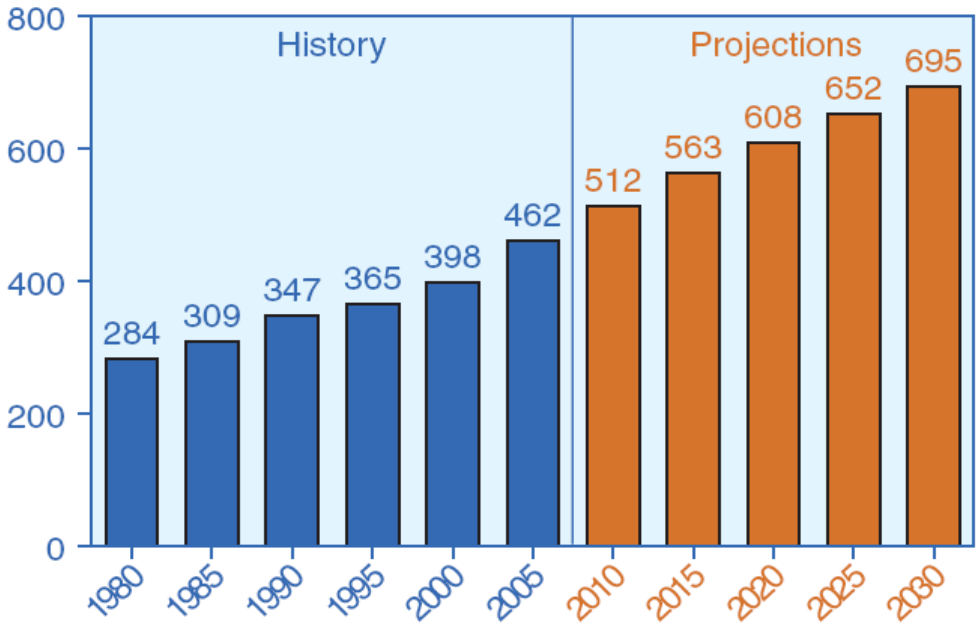
In Germany, the following changes are expected:

- Sea level rise

- Extreme weather occurs more often – with heat waves, storms, heavy precipitation, erosion, dryer areas as possible consequences.
- Glaciers melting down: lower water level in the floods, regional limitations on drinking water, permafrost disappear, increased avalanche risk. This may have impacts on infrastructure as transport network and electricity deliverance.
- Flooding along the river banks: increased erosion.
- Extended vegetation periods.
- Species emigrate or extinct, other species occur.
- Damaging species will make forestry and agriculture more difficult (Germanwatch 2007).

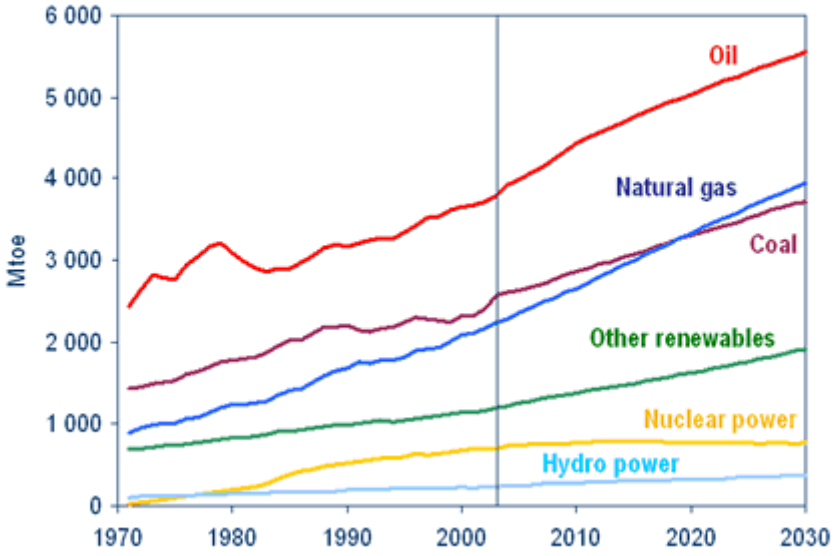
4.2 Global energy demand and recommended emission reduction

Figure 1: World energy consumption 1980 - 2030. Btu. (EIA 2008)



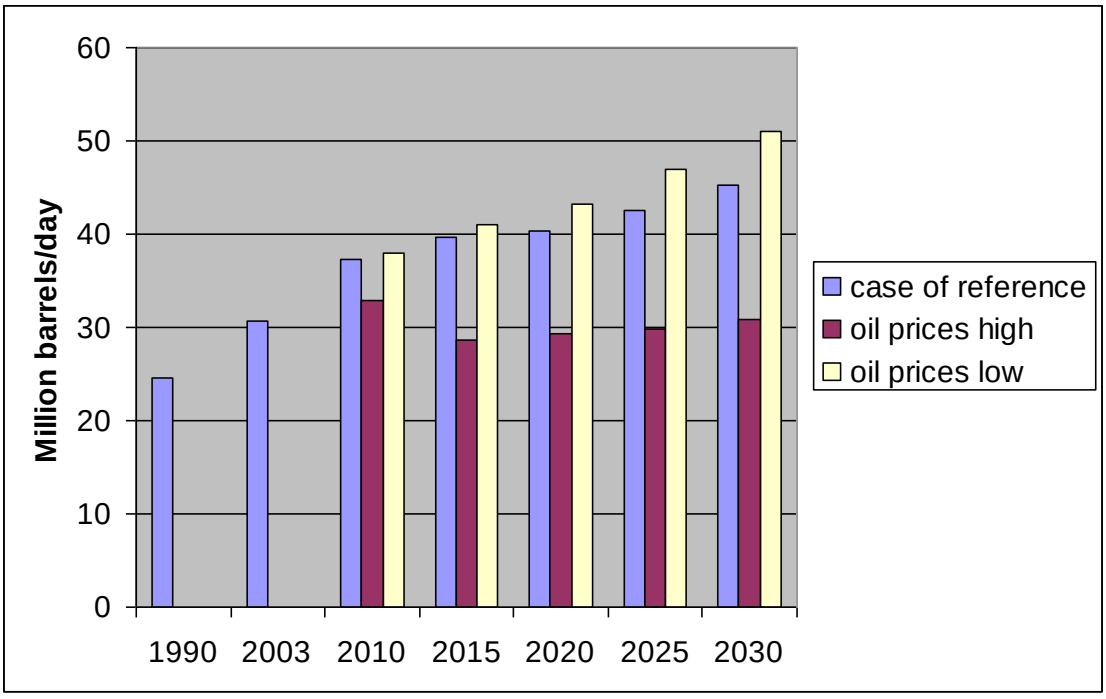
Energy policy is a highly controversial issue. There is major disagreement about for example the potential for development of RES, the potential for energy saving and efficiency, the necessity of nuclear energy and so on. A look at the prognoses for energy demand in the 21st century illustrates the scope of the challenges connected to increased energy production. Both the International Energy Agency (IEA) and the Energy Information Administration (EIA) have predicted that the energy consumption and production will increase dramatically in the 21st century.

Figure 2: World energy demand 1970-2030, by energy source. Mtoe. (IEA 2006)



The *reference scenario*[16] presented in IEA's World Energy Outlook 2006 foresees that fossil energy sources will cover the major part of rise in energy demand. The renewable energy sources will also increase, but will still only make out a marginal part of world wide energy consumption.

Figure 3: OPEC oil production, 1990 – 2030. Million barrels per day. (EIA 2006)



[16] Assumes policies as of 2006, 1 % per year population growth, 3,4 % growth in GDP etc (2006:53). http://www.iea.org/textbase/nppdf/free/2006/weo2006.pdf (10.10.08)

In spite of different predictions of peak oil, which claim that the maximum oil production has already been reached, the EIA predicts that the world wide oil production will continue to increase, to approximately fifty million barrels per day in 2030, almost twice as much as in 1990, the reference year of emission reduction aims in the Kyoto Protocol.

The foreseen increase in energy demand represents a huge dilemma contrasted to the climate scientists' recommendations for emission reductions. The IPCC have stated that a global warming that exceeds an augmentation of two degrees above pre-industrial level will be "very dangerous". This is the reason why several political institutions, including the EU and the Norwegian Government, operate with a "two degree" objective, according to which one must undertake emissions reductions sufficient to avoid a higher temperature rise than two degrees above pre-industrial level. The third working group of the IPCC states that stabilizing the temperature between 2 – 2.4 degrees above pre-industrial level demands that the amount of CO_2-equivalents in the atmosphere stabilizes at a level between 445 and 490 ppm. In 2007, the level was slightly above 380 ppm. The peaking year of the emissions must occur between 2000-2015, and within 2050, the global CO_2 emissions must be cut with 50 – 85% of the year 2000 level. The IPCC has further suggested that after the peak in emissions, a reduction in greenhouse gases in the range of 25-40% by 2020 is necessary (IPCC 2007c).

The emission profiles of these scenarios indicate the need for short-term infrastructure investments for a comparatively early decarbonisation of the energy system. Achieving these low-emission trajectories requires a comprehensive global mitigation effort, including a further tightening of existing climate policies in Annex I countries, and simultaneous emission mitigation in developing countries, where most of the increase in emissions is expected in the coming decades (IPCC 2007b).

4.3 Norway

Norway's energy system is largely characterised by the country's outstanding natural resources, with major implications for both energy and climate policy. Excess of electricity and petroleum products has led to low prices and little tradition for energy savings and efficiency. I will now account for the most important aspects of the energy and climate situation in Norway.

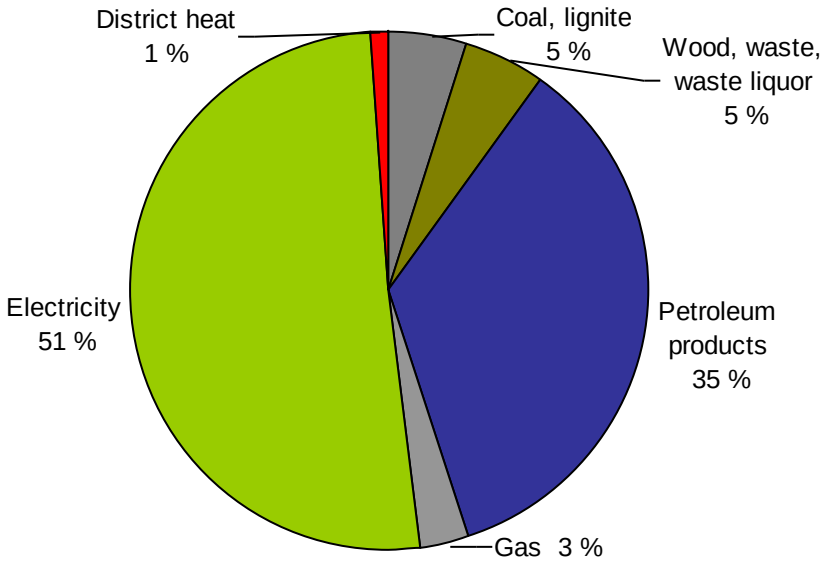
4.3.1 Energy situation

Norway is a net exporter of energy. In 2006, Norway had a total energy production of 2 715 TWh. Of this, as much as 2 389 TWh was exported. The main energy sources for export was

crude oil (1 175 TWh) and natural gas (936 TWh). Norway is one of the largest crude oil exporters in the world.[17] The petroleum sector's gross product accounted for 22.5% of Norway's GDP in 2005.

The total consumption of energy in 2006 was 222 TWh, 14.4% more than in 1990. Of this, 80 TWh went to industry and mining, 60 TWh was used for transport means, and 83 TWh went to other sectors whereof private households 44 TWh, and fishery and agricultural sectors 9 TWh.[18]

Figure 4: Norway's net energy consumption in 2005, by source. (Statistics Norway[19])



Electricity makes up an unusually high proportion of Norway's total energy consumption, compared to almost any other country in the world. As showed in figure 4, electricity covers 51% of Norway's total consumption and is by far the largest energy source. Petroleum products were the second largest energy source with 35%. The electricity consumption is approximately ten times higher than the world mid value. This is due to a large amount of energy intensive industry and the fact that electricity is used for heating purposes to a larger extend than in other countries. Because of favourable geographical conditions, Norway's electricity production is to 99% hydro generated, which historically has led to an excess of cheap electricity. The price of electricity in Norway is still low compared to other European

[17] http://www.ssb.no/energiregn/tab-2007-10-19-03.html (12.07.08)
[18] http://www.ssb.no/energiregn/ (12.07.08)
[19] http://www.ssb.no/emner/01/03/10/energi/fig01-energi2005.gif (12.07.08)

countries. In 2007, the price was approximately 80øre/kWh.[20] This is almost half the price in Germany. The electricity production varies from each year with the amount of precipitation. Since 2000, annual production has been between 143 and 107 TWh/yr.

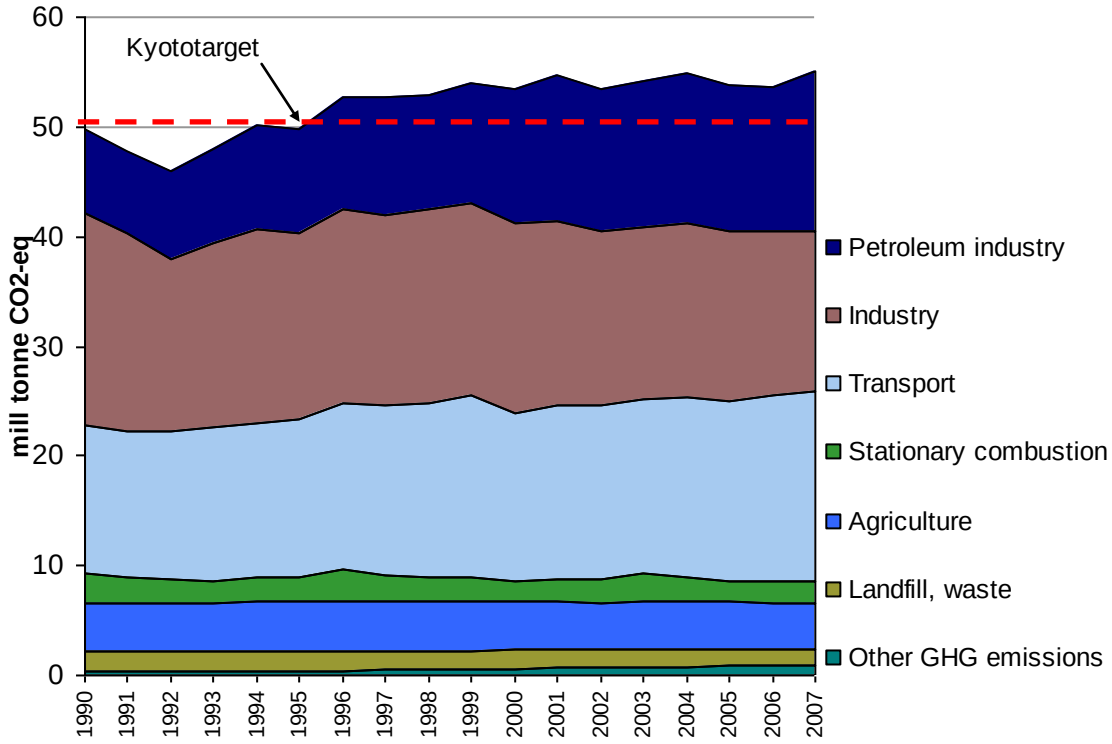
The petroleum sector is Norway's largest industry with immense consequences for the entire Norwegian society. In 2007, the sector accounted for 24% of the country's GDP. Norway was the world's fifth largest oil producer with 2.31 million barrels oil per day in 2007, and the world's third largest gas producer in 2006 with 85.2 billion m^3 gas per year. Crude oil, natural gas and pipeline services accounted for 48% – 509 billion NOK – of the value of Norway's exports in 2007. Through 40 years of operation, the petroleum industry has created values for more than 6000 billion NOK (800 billion EUR). The state has in the same period intervened with huge investments in search, development, infrastructure and constructions. At the end of 2007, these values accounted for more than 2100 billion NOK (250 billion EUR) in 2008 value.[21]

4.3.2 Climate policy

Norway's total GHG emissions in 2007 were approximately 55 million tonnes CO_2-equivalents (CO_2e). Figure 5 shows the main contributors to Norwegian emissions from 1990 to 2007. Because of Norway's exceptional energy production, the major emission sources are industry (15.6 million tonnes), petroleum (13.3 million tonnes) and transport – both air and land (12.8 million tonnes) (St.meld. nr. 34 2006-2007:24).

[20] Corresponds to 10 cEUR
[21] http://www.regjeringen.no/en/dep/oed/Subject/State-participation-in-the-petroleum-sec.html?id=1009 (20.10.08)

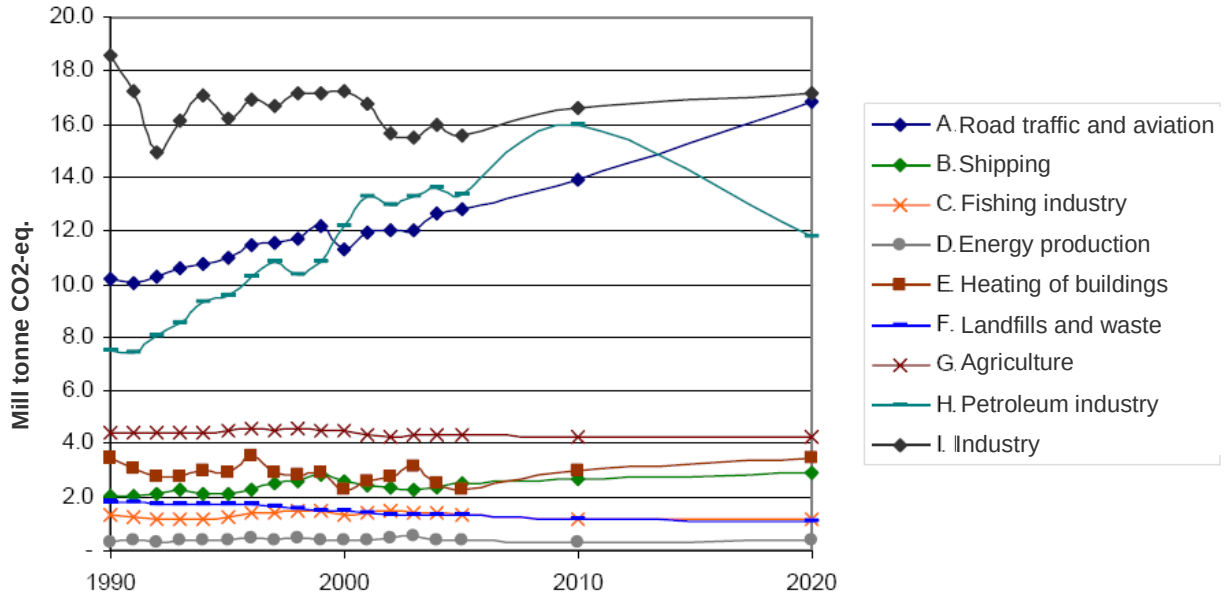
Figure 5: Norwegian GHG emissions 1990 – 2007. Mill tonne CO_2e (Norwegian Water Resources and Energy Directorate (NVE) 2008[22])



The Norwegian Pollution Control Authority (SFT) has conducted a study which estimates that if no new policy measures are implemented, the emissions in 2020 will increase with 9 million tonne CO_2e from 1990-level (49.7 million tonnes). If on the contrary all technical mitigation options are carried through, Norway has an emission reduction potential of 19.9 million tonne – a reduction of 22% compared to 1990-level, spread over 57 different mitigation options within all sectors. The costs of the measures range from below 200 NOK to over 600 NOK/tonne (Langtvedt et al 2007). The measure options involve Carbon Capturing and Storage (CCS), bio fuels, introduction of renewable energy, energy savings, electrification of the petroleum shelf[23], collection of methane gas in the agricultural sector, new waste disposal systems and technological innovation within the shipping industry (Langtvedt et al 2007:3-8).

[22] http://www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=10252 (20.10.08)
[23] Means to supply the off-shore petroleum production with land produced electricity.

Figure 6: Norwegian GHG emissions by sector 1990 – 2020. Mill tonne CO_2e. (Langtvedt et al 2007:14)



The Norwegian Government has stated the following overall aims for the national climate policy:

1. Cutting global emissions equivalent to 30% of Norway's emissions in 1990 by 2020.
2. "Carbon neutrality" in 2030

The emission reduction obligation should be realised with a combination of national measures and the use of the mechanisms in the Kyoto Protocol.[24] In January 2008, the Norwegian Government announced the ambition to undertake two-thirds of the total emission reductions nationally. They nevertheless added that it is not possible to set up specific reduction aims for different sectors because of large uncertainty (St.meld. nr. 34 2006-2007:36-37, *Regjeringen* 2008).

The main principles in Norway's climate policy are 1) governance efficiency 2) cost efficiency 3) polluter pays principle and 4) sustainable development (precautionary principle). Economic and regulatory measures are the most important instruments to attain the climate policy aims. Approximately 70% of the national emissions are now either part of the emission trading scheme or covered by a CO_2-tax. Some emission sources cannot be covered by any of these two, and other measures have to be undertaken to reduce these emissions. (St.meld. nr. 34 2006-2007:46)

[24] The main mechanisms of the Kyoto protocol (also called the flexible mechanisms) are the emission trading scheme (ETS), joint implementation (JI) and the clean development mechanism (CDM).

The emission trading scheme was established in Norway in 2005, and has been one of the most important measures for attaining the country's Kyoto target. In 2007 it covered more than 40% of the national emissions (St.meld. nr. 34 2006-2007:47). In the period 2008-2012, Norway will join the European Union's market for emission trading, and the quota obligation for this period will be more than three times as comprehensive as the previous. For emissions not included in the emission trading scheme, the CO_2-tax is the main measure. It covers approximately 52% of the Norwegian CO_2 emissions. The price varies for different materials. The CO_2-tax for fuel (petrol) is 345 NOK/tonne CO_2, natural gas 200 NOK/tonne CO_2 and the prices off-shore varies between 255 and 342 NOK/tonne CO_2.

After COP13[25] at Bali in December 2007, the Norwegian Ministry of Environment stated that the areas with main priority in Norwegian climate policy would be:

1) Carbon Capture and Storage (CCS). Developing CCS as a new technology.
2) Rainforest. As a rich country, Norway will spend 3 billion NOK per year for the maintaining of rainforest. In January 2008, the public administration will work to establish a system for this.
3) Shipping. As a major shipping nation, Norway has the possibility to develop sustainable solutions for the shipping industry (*Regjeringen* 2008).

Norwegian authorities express the ambition to work for the establishment of an ambitious climate agreement which includes as many countries as possible. The aspiration of urging a cost effective international climate policy is the objective behind Norway's ambitious aims for emission reduction (St. meld 34:38, NOU 2006:18:30).

Klimaforliket (The climate compromise) is an agreement between six political parties[26] about principles, aims and measures in Norwegian climate policy. It states that public spending on climate related research will be increased. This includes development of renewable energy and climate friendly technology. The Research Council of Norway, which distributes public research funding, spent 85.6 million NOK on research within renewable energy in 2007. At the same time, research on petroleum activity – including the funding of research on CCS – received 496.5 million NOK.[27] In the national budget for 2009, financial research means will increase by 300 million NOK for renewable energy, energy efficiency and CCS. By 2010, the total amount shall be minimum 600 million NOK and at least at the same level as the support level for petroleum research (*Regjeringen* 2008).

[25] The 13th United Nation climate negotiation, conference of the parties (COP)
[26] Arbeiderpartiet, Sosialistisk Venstreparti, Venstre, Kristelig Folkeparti, Høyre and Senterpartiet.
[27] http://www.klassekampen.no/49135/mod_article/item/null (16.01.08)

4.4 Germany

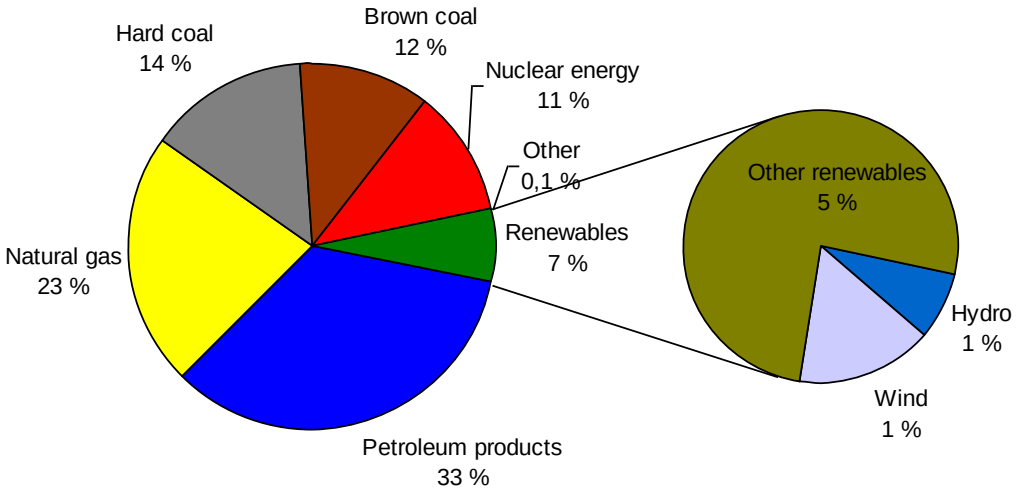
In this section I account for Germany's energy situation, which is characterised by limited domestic energy sources. I also account for Germany's climate policy, which is among the most ambitious in Europe.

4.4.1 Energy situation

In contrast to Norway, Germany is a net energy importer. Its dependency on energy imports is increasing, and accounted for 75% of total energy consumption in 2006. Germany is self supplied in the renewable energies and lignite based energy production. For the other sources the import dependency is respectively 97% for oil, 83% for natural gas and 61% for hard coal. Nuclear power production relies to 100 % on uranium imports, but is in some statistics counted as a domestic energy source. When this is done, the import of primary energy in Germany accounts for 62% (BMU & BMWi 2006). The most important import country for oil and gas is Russia with more than 40% of gas imports, followed by Norway. Russia and Norway together account for more than 2/3 of Germany's gas imports and 50% of its oil imports (BMWi 2008).

In 2006, Germany's primary energy consumption was 4055 TWh. Thereof, 1084 TWh were produced nationally and 3568 TWh were imported. Final energy consumption was 2618 TWh. This was divided almost equally between the sectors industry (741 TWh), transport (733 TWh), households (745 TWh) and trades and services (398 TWh).

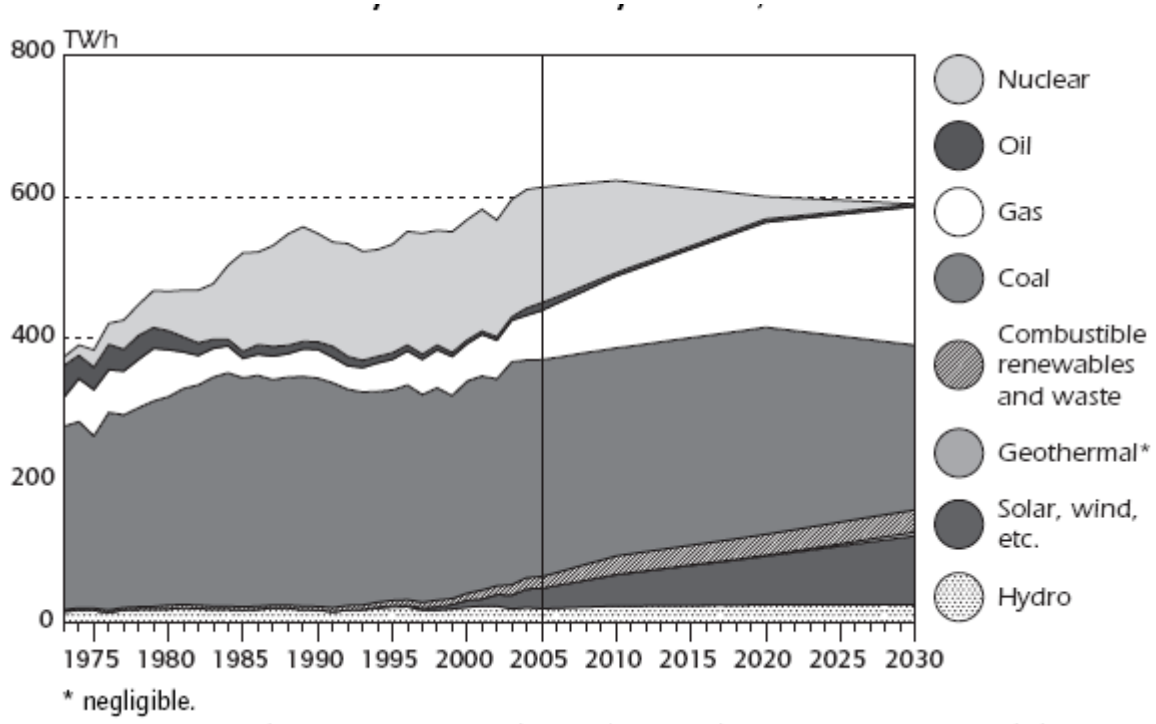
Figure 7: Primary energy consumption in Germany 2007 (BMWi 2007).[28]



[28] http://www.bmwi.de/BMWi/Redaktion/PDF/P-R/primaerenergieverbrauch-2007-grafiken,property=pdf,bereich=bmwi,sprache=de,rwb=true.pdf (20.07.08)

As shown in figure 7, primary energy consumption is dominated by crude oil (33%), of which the major part is used for transport. This is followed by coal (26%) and natural gas (23%), used for electricity generation and directly for cooking and heating purposes in the households. Compared to other IEA countries, Germany's share of RES (7%) in its primary energy consumption is very high. RES has grown tremendously in recent years from 1.8% of primary energy supply in 1995 to 4.6% in 2006, equivalent to an average annual growth rate of 10.1% (IEA 2007).

Figure 8: Primary energy supply to Germany's electricity production 1975 – 2030. (IEA 2007)

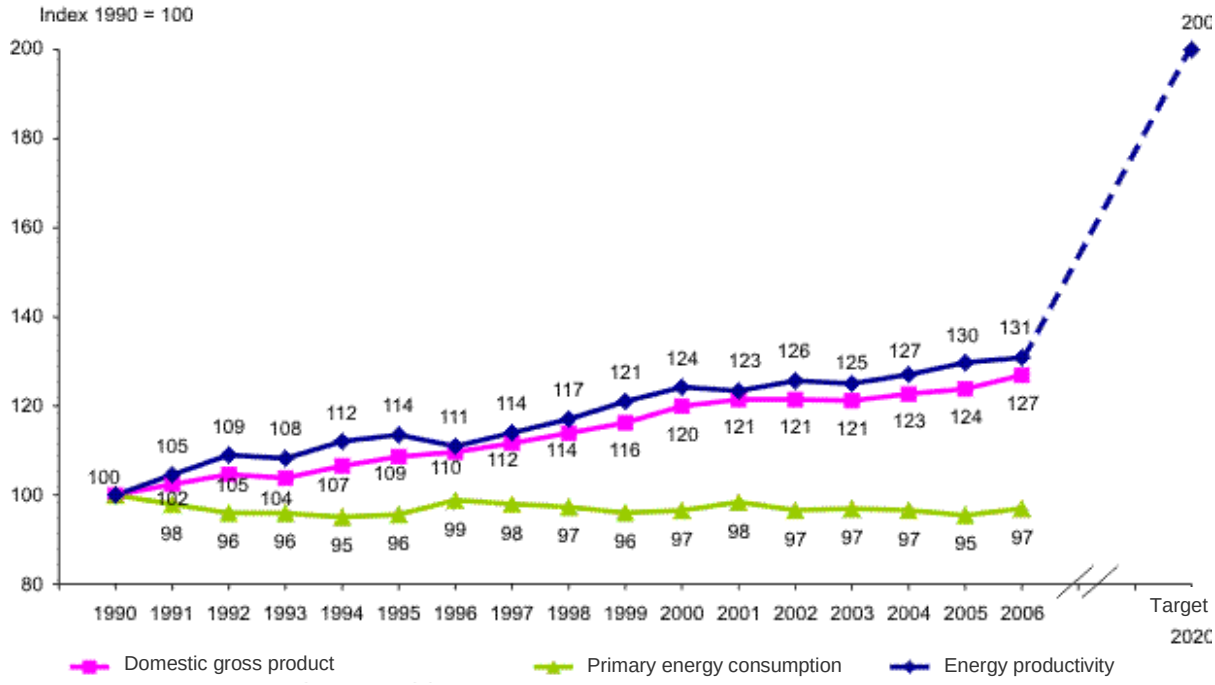


The total electricity production in 2007 was 636 TWh. To attain this amount, the input of 1491 TWh from combustibles was required, equivalent to 39% of the total primary energy consumption. The composition of primary energy sources needed for electricity production consisted of 29% nuclear energy, 28% lignite, 25% hard coal, 10% gas and 8% other sources. As shown in figure 8, the source with the largest growth has been natural gas and RES (IEA 2007). Renewable energy sources accounted in 2007 for 87 TWh (14%) of gross electricity

production, spread on the following sources: 21 TWh hydropower, 40 TWh wind, 25 TWh bio mass and about 4 TWh photovoltaics (PV) (BMWi 2008).[29]

The energy consumption in Germany has been declining since 1990, and economic growth is hence decoupling from it, as shown in figure 9. This is to a large degree a consequence of a comprehensive change in the energy production in the former GDR, where power was generated at low efficiency. The political ambition is now a doubling of the energy productivity by 2020, compared to 1990.

Figure 9: Primary energy consumption, GDP and energy productivity in Germany 1990 – 2006. (German Federal Statistical Office 2008)



The Federal state's expenditures for research on energy in Germany was 417 million EUR in 2007 and accounted for almost 5% of the state's total research expenditures. Of this, 205 million EUR was used for RES and energy saving research. Almost 200 million went to nuclear research purposes and 12 million EUR were addressed coal and other energy sources.[30]

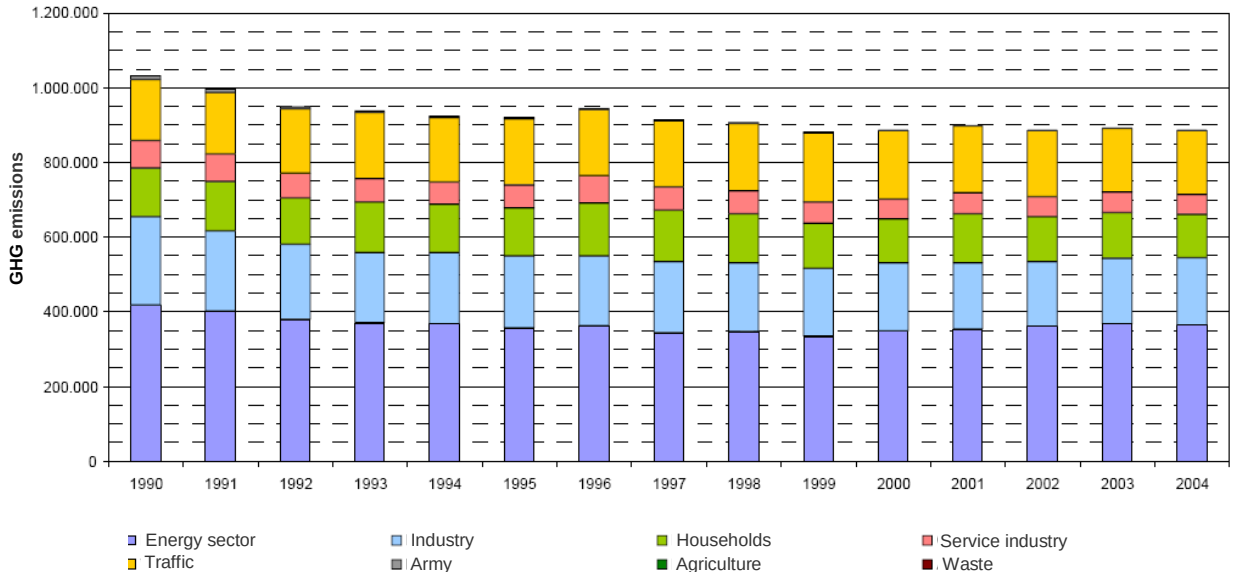
[29] http://www.bmwi.de/Dateien/Energieportal/PDF/energie-in-deutschland,property=pdf,bereich=bmwi,sprache=de,rwb=true.pdf (12.07.08)
[30] http://www.bmwi.de/BMWi/Navigation/Energie/energiestatistiken,did=180962.html (20.07.08)

4.4.2 Climate policy

As EU member and founder country, Germany has to follow the instructions of the EU. At the same time, they also have an influence on the EU's climate policy. EU has adopted the IPCC's recommendations as their overall aim for the climate policy: to stabilise the temperature-rise at two degrees above pre-industrial level.

In 2004, the German GHG emissions were 1025 million tonnes CO_2e. This is a reduction with 17% compared to 1990. The majority of this reduction took place the first ten years after 1990, and is mainly a result of the substantial structural changes, above all the reorganisation of industry after the German unification. By 1990, the East German GDP was about 40% of the West German, but the per capita energy consumption was 120% of the West German consumption. For electricity, the per capita consumption was the same in both countries, but the per capita CO_2 emissions in East Germany were twice as high and the SO_2-emissions ten times as high as the West German per capita level. There was, in other words, a huge GHG emission reduction potential in the so-called *Neue Bundesländer* (Fröhler 2001:11). Since 2000 the German emissions have remained at a relatively stable level (McKinsey 2007:23).

Figure 10: Annual CO_2 emissions in Germany 1990 – 2004 (UBA 2006). [31]

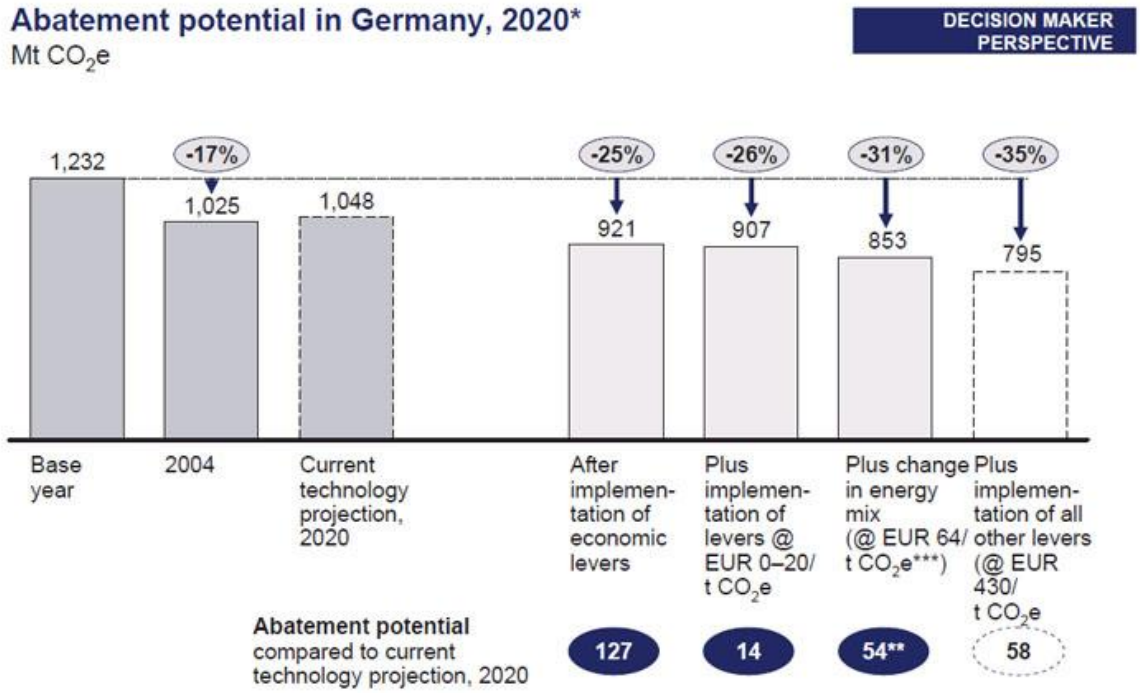


[31] http://www.umweltbundesamt.de/uba-info-presse/hintergrund/Trendtabellen_Emissionen_DE_1990_2004_CO2.pdf (12.04.08)

The German Government has expressed the ambition to reduce their climate gas emissions with 40% compared to 1990-level by 2020, *on the condition* that other countries also oblige themselves to remarkable emission reductions. In August 2007, the German Government published an *integrated paper on energy and climate policy*, the so-called Meseberg paper, with a list of measures to be undertaken by 2020. Calculations have shown that these measures will cause a reduction in GHG emissions of 36-37% by 2020 (*Bundesregierung* 2007).

In September 2007, the McKinsey-study made for the Federation of German Industries (BDI), was published. It estimated the potential and costs of reducing greenhouse gases in Germany by 2020 and 2030. The results are presented in figure 11. According to its calculations, many of the measures would actually generate a positive payoff. A total of 127 Mt CO_2e could be reduced through levers with abatement costs that would pay back within the amortisation period (McKinsey 2007:15). This corresponds to a reduction in GHG emissions of 25% compared to 1990-level by 2020. Utterly 14 Mt CO_2e could be abated at a cost less than 20 EUR/tonne CO_2e. A reduction with 31% is possible when measures with distinctly higher costs, between 32 and 175 EUR/tonne CO_2e, are included (McKinsey 2007:14).

Figure 11: Potential and costs of reducing GHG emissions in Germany by 2020. (McKinsey 2007)



The Meseberg paper was based on calculations from the Fraunhofer Institute for Systems and Innovation Research, which showed that Germany can profit 5 billions EUR in 2020 if the specific measures listed in table 2 are realised.

Table 2: Reduction potential by 2020 of several measures. Mt CO_2e. (*Bundesregierung* 2007)

Measure	**Reduction potential by 2020 million tonne CO_2-equivalents**
Renewal of fossil power plants	15.0
Renewable energy production	54.4
Combined heat and power generation	13.3
Renovation of housing and heating constructions	31.0
Renewable heating	9.2
Electricity saving	25.5
Transport measures – bio fuels, incorporation of air transport in ET, measures for shipping etc	33.6
Measures for other GHG (methane, N_2O, F-gases)	36.4
Sum	**219.4**

The climate policy is expected not only to reduce climate gases. The German authorities have high expectations to the positive effects of the climate policy for the economy and entire German society. First of all, the climate/renewable strategy is expected to create jobs in the new branches that deal with renewable energy and energy saving. In 2007, almost 150 000 people worked within this sector, and the BMU estimates that the sector can provide 500.000 extra jobs within 2020. The Government estimates the annual costs of the planned climate protection program to be approximately 3 billion EUR until 2010. It argues that the costs of *not acting* against climate change, i.e. the costs of the damages, will be much higher than the costs of an ambitioned climate policy. An additional positive side effect of the climate policy is the saving of 20 billion EUR per year for energy imports within 2020, and almost 35 billion EUR per year within 2030. The program will also boost net investments with more than 30 billion EUR per year and hence create more economic growth.[32]

An important aspect of the German climate strategy is their role as a pioneer in the international development, with regard to reducing GHG emissions nationally and also in their effort in the international negotiations towards a new binding agreement that will follow the Kyoto protocol after 2012.[33]

[32] http://www.bmu.de/pressemitteilungen/aktuelle_pressemitteilungen/pm/41698.php
[33] http://www.bmu.de/files/pdfs/allgemein/application/pdf/hintergrund_klimaagenda.pdf

4.5 Concluding remarks

Norwegian and German energy and climate policies differ largely, first of all because of substantial differences in the design of their energy systems. German energy consumption is about 18 times higher than the Norwegian. Norway's electricity supply is completely covered by hydropower, and contributes in this respect insignificantly to Norwegian GHG emissions. In Germany, electricity production is the main source for the country's GHG emissions (43% in 2002), and most of the abatement measures are therefore directed at reorganising the energy sector, including insulating houses, improving coal-based power plants (or change to natural gas) and increased use of combined heat and power plants (see table 2). Norway has a huge potential for RES because of favourable natural conditions, whereas Germany with a large and densely situated population have larger possibilities within the sphere of energy saving and efficiency. According to *Fornybar energi 2007*, the Norwegian wind power resources are notably larger than Germany's, and the potential for bio mass is estimated to 140 TWh (Fornybar energi 2007). Germany's long-term potential for wind power and bio mass is in one study estimated to 262 TWh and 87 TWh respectively (Schreyer & Mez 2008). Despite this fact, the German policy for development of RES is far more ambitious than the Norwegian. So is the German target for national emission abatement, which aims at 40% reduction by 2020 compared with 2/3 of 30% in Norway. This may be related to the fact to cut emissions in Norway would probably implicate interventions in the petroleum sector, which is very important for the Norwegian economy. Development of RES would not lead to significant emission reductions in Norway, unless saved energy could replace other polluting sources, such as fuels for transport mean, gas-based power station on the petroleum shelf or be exported to central Europe. This is very different in Germany, where increased energy efficiency and renewable energy production is hoped to combine emission abatement with lower energy costs and reduced import dependency.

5 State and industry inter-linkages in the energy sector

Both the German and the Norwegian energy sector are subject to extensive policy regulation by public authorities, which is the case for most industrialized countries. Intervention from the state is particularly conspicuous in the electricity sector, as this sector is characterised by natural monopolies and thus a need for central coordination. Energy use often impacts the environment, and thus the attention of the authorities is necessary. Extraction of lignite and hard coal, development of hydropower and power grids, influences the natural environment, whilst heat power production and combustion of fossil fuels involves emission to air. The standard economics view is that state intervention in the energy sector prevents market failure. This is important for a country's economy, as energy plays a key role for the entire production system as a central part of production costs (NOU 1998:11, Dahlmann 1990:232).

5.1 The case of Norway

The Norwegian state has played an outstanding role in the development of its energy sector. As the energy sector is largely dominated by hydropower, this is true for the electricity sector in particular. Compared with the other Nordic countries, the Norwegian electricity sector has doubtless been the one most dominated by politics (Thue 1995:25). The Norwegian Water Resource and Energy Directorate has played a central role in this development since its forerunner, *Kanalvesenet*, started to buy property rights to waterfalls on behalf of the state in 1894.[34] In 1921, the Norwegian Water Resource and Electricity Department (NVE) was established. It was at the same time a developer of hydropower, a power producer and responsible for granting concessions for developers of hydropower. Considerable state intervention was also the case as Norway started to produce petroleum in the 1970s. In the next sections I will account more detailed for these developments within the Norwegian electricity and petroleum sector.

5.1.1 Exceptional hydropower resources

The development of Norwegian hydropower resources was a result of the organisation of two main interests: to secure domestic control over national resources and the need for foreign capital and competence for the construction of power stations. Based on the Act of *Hjemfall* (see below), alliances with foreign investors was made possible (Sejersted 1999:16). This use

[34] http://www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=5744 (20.10.2008)

of foreign investment and know-how was later to be repeated in the development of the petroleum sector.

The political choice to combine national control with foreign investment was possible because of political, demographical, social and historical reasons. The main traits of the organisation of the electricity sector originated in the early formative periods of the sector from the end of the 19th century up to 1930, and remained up to the early 1990s. Key factors in the development of the energy sector were the hydropower resources, a strong tradition for municipal and regional autonomy and a nationalistic orientation (Magnus & Midttun 2000). Because of Norway's early democratisation – 40% of all Norwegian men, including peasants, were given the right to vote in 1814 – Norwegian peasants used municipal institutions as an organisational device both for political mobilisation and developing local infrastructures. Local Governments also benefited from considerable economic autonomy (Thue 1995:19). During the first years private utilities were dominant in the cities, but within a few decades municipal ownership won out (Thue 1995:16). As early as in 1887, the Government opened up sites for dams and regulation of watercourses for expropriation, and in 1894 a law was passed that made it easy to have sites expropriated for building transmission lines. These progressive reforms – that sometimes offended rural interests – can be explained with the close alliance between a strong administrative elite in the state apparatus and the merchants and industrialists in the cities during the 19th century (Thue 1995:16). To a certain extent, municipalities functioned as cooperative organisations for the users of electricity. Municipalities' fixing of prices was to offer electricity as cheaply as possible. The utilities should balance their incomes and expenditures, not make profit. As a result, the electricity sector became more network-like than market dominated. At least indirectly the consumers decided the price of electricity, often after intense political discussions in the community (Thue 1995:17).

In the period 1905 to 1930, decisions were made that influence the electricity sector even today. The wide natural dispersion of hydro-resources made it possible for a number of municipalities and inter-municipal consortia to engage in local development of hydropower projects. From the end of the 19th century, foreign capital was invested heavily in hydropower production and in the electrochemical and electrometallurgical industries. Norwegians themselves lacked capital for large investments like hydropower and large industry development. In 1906, foreigners owned more than 3/4 of the developed waterfalls (NOU 2004:26). In reaction to the expansion of mostly foreign-owned big industry, the Norwegian social liberal Government strictly regulated the private exploitation of the hydropower

resources. The most central measure in this policy was the Act of *hjemfall* that was passed in 1906. *Hjemfall* introduced concession obligation for expropriation of watercourses and development of larger waterfalls. According to the concession Act of 1909, private actors can obtain concession for a limited period of time (normally 60 years). When the period ends, the hydropower resources and power plant constructions goes to the state without compensation, i.e. the resources *falls home* (= *hjemfall*). The Act ensured that private and foreign capital could develop the hydropower resources whereas the authorities could control the exploitation of the resources and access to the ownership in a long term perspective. *Hjemfall* also secured income to state and municipalities, as the private actor was obliged to give away up to 1/3 of the profit. It hence clearly favours the municipalities and counties as suppliers of electricity for general purposes (Thue 1995:22). The background for the Act of *hjemfall* was the possibility to manage the hydropower resources for the best of the commons (NOU 2004:26).

From the late 1920s the state became involved in hydropower production through NVE, initially mostly to supplement the efforts of local authorities. In 1938, the Norwegian Parliament granted support for the installation of electricity to the remaining 25% of the population that were still lacking it, and NVE carried out the task by the mid 1960s. After the Second World War, NVE also became an important supplier of cheap electricity for energy-intensive industry (Thue 1995:22-23). In the following years, the state took responsibility for serving power-intensive industry with large quantities of cheap power and strengthened the regulation of the power sector. From the late 1960s environmental questions contributed to this development (Thue 1995:27).

In 1986, NVE went through a major reorganisation and its previous responsibility for power production and the power grid was handed over to *Statkraft*, a fully state-owned company. Statkraft has bought holdings previously owned by municipalities or counties because of politically addressed support from the Norwegian parliament and owns today about 45% of the Norwegian production capacity (NOU 2004:26). *Statnett* was established 1990 and took over the responsibility for the power grid. In 1990 the Norwegian Parliament approved a new Energy Act which entered into force January 1991. It introduced competition in production and trade with electricity, while at the same time central Governmental control over transmission and distribution activities was strengthened. The Norwegian reform aimed primarily at introducing competition rather than privatisation, and the Norwegian electricity industry has for the main part remained in public hands (Magnus & Midttun 2000:1, NOU 2004:26). By 2004 88% of the power production and almost 100% of the power grid was the property of public companies. In 2007, the state took out 6.7 billion NOK in profit from

Statkraft and *Statnett*. The municipalities and counties, which hold around 42 % of the Norwegian capacity, took out 3.2 billions and 736 million NOK respectively from their energy companies (Statens eierberetning 2007).

5.1.2 The petroleum sector

The history of Norwegian oil and gas development began in the 1960s, when American Phillips launched its interest in activities on the Norwegian Continental Shelf. In 1969, the first large finding of oil in the North Sea was made. Foreign companies were investing large sums in the exploration of Norwegian, British and Danish sea ground, and in the following years several large findings was made. The Norwegian Authorities nevertheless wanted to integrate the petroleum activity in the Norwegian society. In 1971, ten "oil commandments" was passed by the Norwegian Parliament, which described the basic principles of the future oil policy. The commandments states that all activity on the Norwegian Continental Shelf should be under national governance and control. As a consequence, the fully state-owned oil company Statoil and the Norwegian Petroleum Institute was founded in 1972. Statoil was the most important instrument for the national control over the petroleum resources. Throughout the 1970s, Statoil enjoyed a lot of privileges before all other actors in the sector when concessions and profit shares were distributed. The authorities also passed a rule that proscribed 50% state participation in every petroleum extraction concession. The intention was that the Norwegian society should take part in the oil activity on all levels. In 1985 the state's involvement in the petroleum sector was divided into the company Statoil and The State's direct financial interest (SDFI). The latter implies that the Norwegian State participates in the Norwegian petroleum sector directly as an investor in oil and gas fields, pipelines and constructions on shore (Sejersted 1999:21, 25, 30).[35]

Johan P. Olsen introduces the term "petrolisation" to describe the development within the Norwegian petroleum sector. *Petrolisation* opposes *politisation*, and implies that parts of the petroleum activity are withdrawn from political governance because the processes are not in touch with the traditional political institutions. Olsen argues that the Norwegian petroleum sector has been subject to such a development, despite that the public control over the sector was established by law. The explanation for this is that the industrial technological development was put outside policy processes already in an early stage. The petrolisation was therefore a political decision (Sejersted 1999:11). Correspondingly to Olsen's thesis, Hauge

[35] http://www.regjeringen.no/nb/dep/oed/tema/Statlig_engasjement_i_petroleumsvirksomh.html?id=1009 (12.09.08)

finds that the process for issuing concessions for petroleum development to a large degree is a de-politised process because it is governed by the political bureaucracy and not by the political instances Government and Parliament (Hauge 2007:112).

The shape of the inter-linkages between state and industry within the petroleum sector has changed substantially since the establishment of Statoil. In the 1990s, a process started to turn Statoil into a commercially active oil company, which could compete side by side with other international energy companies on the international market. The Norwegian Parliament decided to convert Statoil into a stockholding company in 2001, and opened 1/3 of the stocks for sale to private investors. In 2007, Statoil merged with Norsk Hydro into StatoilHydro. The Norwegian state holds almost 63% of the stocks in the company, a share that will increase to 67% over time. Today, StatoilHydro operates as any other actor on the Norwegian shelf. The company's board is responsible for the commercial development of the company. The function of continued state ownership is to secure national competence and employment.[36]

Since the 1990s, the mutual influence of state and industry to an increasing degree takes place in common fora and foundations created to strengthen the alliances between involved actors. One important institution is INTSOK - Norwegian Oil and Gas Partners, a foundation established in 1997 by the Norwegian oil and gas industry and the Norwegian Government. INTSOKs objective is to strengthen the long-term basis for value creation and employment in Norwegian petroleum industry through international activity.[37] As a consequence, Statoil has been internationalised with large intensity, backed up by a highly active state. The company that was established as a national political instrument to confront multi-national companies has therefore turned into one itself. According to Sejersted, a clear division between public and private sector has been replaced by a large grey zone with alliances as well as concurrence between public and private interests, which has contributed to an increased de-politisation of the petroleum sector (Sejersted 1999:71, 98-99).

KonKraft Topplederforum is another institution where all actors that either work in or for the petroleum sector have gathered. According to Ytreberg (2008) this forum worked intensely from 2000 to 2006 to open the northern areas for petroleum extraction.[38] In 2001, the newly-elected Government declared to stop the search for petroleum until there had been a neutral report about the area's vulnerability in environmental regards. After a long struggle

[36] http://www.regjeringen.no/nb/dep/oed/tema/Statlig_engasjement_i_petroleumsvirksomh.html?id=1009 (10.06.2008)
[37] http://www.intsok.no/ (10.06.2008)
[38] The Northern sea regions had been closed for petroleum activity out of environmental considerations.

between the oil industry and the environmental movements, the Norwegian Parliament in 2006 voted for petroleum extraction in the Barent Sea (*Barentshavet).* According to Ytreberg, this was a result of Konkraft's offensive strategy to turn the political opinion. From 2002 to 2006, the petroleum industry spent more than 100 million NOK (12 million EUR) on an environmental program, addressed to strengthen the environmental profile of the industry, to influence the opinion and secure admission to new areas of exploration.

Ytreberg describes the actors in the petroleum sector as so closely interwoven that they appear as a cluster. In the minutes from Topplederforum's meetings, the actors also refer to themselves as "the oil cluster". Ytreberg's journalism revealed that The Ministry for Oil and Energy, which is supposed to be neutral and governed by elected members of Parliament, was one of the oil industry's most important allies in the struggle with the environmental movements about petroleum extraction in northern areas.

Reitan has studied the development of Norwegian environmental policy and describes the involved actors and institutions (See chapter 2.2). According to Reitan, there has been continually stable interaction between industry interests both on the inside and on the outside of the political bureaucracy. Her findings reveal that the Ministry of Industry and the Ministry of Economy both advocated the industry's interests in environmental decision processes. In Reitan's case studies – pollution policy in the 1970s and 1980s and climate policy in the 1990s – the industry presented suggestions and interests which the Ministries absorbed and promoted to other parts of the political system (Reitan 1998:202-203). Reitan identifies strong cooperation and common interests between the industry organizations for both cases. A possible explanation outlined by Reitan is that the industry is a more clearly defined sector than the environmental field.

5.1.3 Development of new renewable energy

The Government has three main groups of measures for development of renewable energy: 1) measures carried out by Enova, 2) economic and regulatory measures and 3) research and development (Størvold 2008).

Enova was established 2002 and is a state owned company responsible for an environmentally friendly restructuring of energy use and production in Norway, including energy efficiency and public development support for new renewable energy in Norway.[39] Norway has a joined ambition to achieve 15 TWh from energy saving and development of

[39] http://www.nve.no/modules/module_109/publisher_view_product.asp?iEntityId=5746

new renewable energy within 2010. Renewable energy development is first of all promoted through direct subsidies on produced energy (hydropower 4 øre/kWh, wind power 8 øre/kWh and bio energy and other *non-mature* technologies[40] 10 øre/kWh). Enova is financed through the state budget and a fee on electricity (St.meld. nr. 34 (2006-2007):114).

5.2 The case of Germany

Germany resembles Norway with regard to a long tradition for close inter-linkages between energy companies and the public authorities, i.e. the Federal state, the *Bundesländer* and municipalities. The interaction takes place on different arenas and in different forms, of which subsidies, regulations, lobbyism and ownership are the most important (Corbach 2007, BMWi 2008, Gammelin & Hamann 2006). As a net energy importer, security of supply has always been crucial for Germany. The authorities have therefore prioritised policy measures enhancing domestic energy production, including heavy subsidising of coal production and public funding of R&D of nuclear power (Storchmann 2005, Scheer 2006). In recent years, there has been an increased focus on RES, which besides reinforcing domestic energy production contributes to the reduction of GHG emission (see also chapter 4).

5.2.1 Powerful electricity companies

The close connection between state and industry is above all a consequence of political decisions taken during the emergence of the electricity sector in the end of the 19th century. The first energy companies in Germany were partly state owned. Private, state and municipal shareholders participated in the emerging regional networks. For example, in 1914, half of the shares in *Rheinisch Westfälische Energiewerke* (RWE) were owned by municipalities and the other half by private companies. *Preussische Elektrizitäts AG* was mainly state owned. In 1913, purely private companies accounted for 26% of capacity and the municipalities had a controlling interest in all but one of twenty-five regional companies (Millward 2005:134-135, 141).

In 1935, the Energy Industry Law (*Gesetz zur Förderung der Energiewirtschaft*) was passed, which promulgated that all investments in power generation and in the transmission grid had to be approved by the Minister of Economics. The law encouraged a monopoly position of the deliverance companies and at the same time set them under a supply duty (Dahlmanns 1990:236). The reasons for the Law were to ensure that "the consumption of

[40] Technologies that are not competitive in the market yet, including wave power, salt power, tide power etc.

energy was in the interest of the common welfare and to avoid damaging economic effects of competition". It was argued that "energy supply is an important good, which should be available for all citizens to the same conditions, no matter if he or she lives in a city or far away from existing infrastructure" (Fröhler 2001:230). Because of the inconvenience this implies for the supplier, he was guarantied a (time restricted) regional monopoly, i.e. a certain area in which no other energy supplier would be granted the permission to produce or deliver energy. The Energy Industry Law remained the basis of the German Energy industry until the liberalisation in 1998 (Fröhler 2001:229-230).

After the Second World War, there was a strong tendency towards public (state or municipal) ownership in most of Europe, and the grip of central Government was reinforced. The Germans had a deep suspicion towards the state sector after the war, and the German state sector was therefore not expanded. Nevertheless, the Law of 1935 remained unchanged and after 1946, the Federal Government of West Germany had extensive holdings in a large part of the energy industry. This also applied to the power transmission grid, which was taken care of by nine companies, of which four were state owned, five were state owned to 50% or more, and the last was RWE with 30% state ownership. (Millward 2005:140, 176). East Germany turned into a socialist nation state with a centrally planned economy. This had major implications for the energy sector, which was kept under state control until the unification with West Germany 1990 (Fröhler 2001).

The ownership structure of the West German infrastructure industries and manufacturing was an inheritance rather than the result of a conscious drive to public ownership (Millward 2005:179). Many historians and commentators in several countries have wanted to see the origins and ideology behind state enterprise in their country as rather distinctive. Until 1950, this was nevertheless a common pattern. The problems inherent in network industries and the technological developments in the supply of infrastructure services had forced public authorities to intervene quite strongly. As late as 1963, public ownership accounted for 81% of the investments in the West German energy sector. State ownership in the electricity sector took the form of joint stock companies with the state owning from 25% to 100% of the shares (Millward 2005:181-182). From the 1960s, German electricity production gradually was gradually privatised (Wengeroth 2000:121). In the 1980s, the state and the *Bundesländer* reduced their participation in the energy sector to a large degree, and many of the companies experienced progressive privatization. At municipal level, 50% public participation remained standard, with reference to arguments of security of supply (Dahlmanns 1990:237, Adamek & Otto 2008:52).

In 1990, former West and East Germany were unified. The two countries differed strongly in the organisation of their economies and energy sectors. This has had major implication for the setting of the German Kyoto target and its achievement, as the East German Energy sector was characterised by low energy efficiency (see chapter 4.4).

The time after the German unification coincided with the efforts of the EU to liberalise the grid bounded energy markets and to establish a European single market (Fröhler 2001:1-2). After several years of negotiation, the Energy ministers of the EU agreed upon a liberalisation of the EU electricity industry. The EU electricity directive prescribed an opening of the electricity market within 2006 (Fröhler 2001:235).

Despite of extensive privatization, the German energy industry is still closely interlinked with policy. The activities are carried out by approximately seven associations, hundred sector groups and 1500 official access managers. The lobby activity is comprehensive, and the lobbyists have close connections to some of the Members of the *Bundestag* (The German Parliament) (Gammelin & Hamann 2005:194-195). There are also economic as well as personal interweavements, and there are many politicians that are represented in the energy companies' boards of management (Corbach 2007:13). The liberalisation of the German energy market and introduction of the modified Energy Act of 1998 was difficult to carry out. According to Fröhler, this was not only a consequence of the technical and legal peculiarities of the energy sector, but to a large degree the industry's close relationship and mutual exertion of influence of the authorities (Fröhler 2001:229). The latter is an issue still widely debated in Germany. Many authors have written about the huge influence from the energy industry in the making of the new Energy Act of 2005 and have questioned whether the large impact from energy companies in the making of policy should be allowed (Gammelin & Hamann 2006, Adamek & Otto 2008, Leif & Speth 2006). Mez has described the German energy industry as an economic and political power cartel which is able to prevent attempts to change the present energy policy at all levels of execution (Mez 1996:158 in Corbach 2007).

The four largest companies dominate today the German electricity market to 80%, and RWE and E.on control 2/3 of the gas market. The four large companies own 100% of the power and gas grid (Gammelin & Hamann 2005:203-207, Kemfert & Traber 2008:178, Adamek & Otto 2008:55-56). After the liberalisation of the energy market in 1998, a large market occurred where new actors where allowed to offer electricity without power stations of their own. As a result, the prices declined by as much as 50% for industry customers and 20% for private households. But it took only two years before the electricity and gas suppliers had

readapted to the market and established an oligopolistic market structure. More than eight companies merged into four: Viag and Veba merged into E.on AG, the largest supplier in Europe, RWE merged with VEW into the second largest supplier in Europe, Vattenfall took over Bewag, Veag and HEW in the *Neue Bundesländer* and frensch EdF bought holdings in EnBW. According to Kemfert & Traber (2008:179*),* Germany never really introduced an energy policy based on competition in a free market. In 2003, the energy prices rose again and the EU commission intervened and demanded a controlling authority to watch the market – already common practise in all other EU countries – to be passed by July 2004. Because of strong resistance from the energy industry and intense lobby activity, it took three years for Germany to create the new Energy Industry Law. The law ensures that everyone who wants should be able to transport electricity and gas through the infrastructure grids as long as they pay a reasonable fee.

According to Gammelin & Hamann (2005), the creation of the new Energy Act 2005 was highly influenced by the energy companies. The Minister of Energy and Technology consulted the executive boards of the energy companies before the law was passed, and lobbyists contributed to the formulation of important paragraphs. The policy executive of RWE confirmed the cooperation, which was characterised as fruitful because it helped the employees in the Ministry to keep the overview of increasingly complex information and interests (Kemfert & Traber 2008:179, Gammelin & Hamann 2005:215-216).

5.2.2 Nuclear energy policy

Germany has 17 operating nuclear power reactors, comprising 21% of installed capacity. The production of electricity in nuclear power plants in Germany goes back to the 1950s. In 1957 the research reactor at Munich technical university was set into operation and in 1959 the Law for nuclear energy is passed that confirms the promotion of nuclear energy. 1961 the power plant Kahl was the first nuclear power plant to produce electricity for public purposes in Germany. According to Scheer, the development of nuclear energy was made possible with large financial support from the authorities. In the OECD countries, the Governments have spent more than 300 billion USD on research and development on nuclear energy since the 1950s and up to 1992. (West) Germany alone has since the 1950s subsidised developers of nuclear energy with 20 billion Euros for the construction of research reactors, nine milliards for failed projects (the fast breeder project among others) and 14.5 billion for waste disposal, restoration and the closing down of reactors (Scheer 2005:112). Nuclear power production in Germany has nevertheless been heavily disputed since the beginning of the 1970s, parallel

with the large scale development of nuclear power (Roose 2006:273). After decades of struggles between the people arguing for and against nuclear power, the German Government passed in 2000 the Law that ensures that all German nuclear power plants will be shut down within 2021.[41] The exit (*Ausstieg*) from nuclear power production is still a disputed topic in German public debate, and proponents of extended operation permissions argue that climate policy is only possible combined with nuclear power production. A report from the Ministry of Economics and Technology published 2008 affirms that Germany's energy security is not set in danger because of the exit from nuclear power.[42]

5.2.3 Coal

The coal policy has been a controversial topic in Germany for decades. For almost half a century, Germany has paid significant subsidies to the hard coal mining sector. In 2002, Germany provided almost 4 billion Euros in production related subsidies (Storchmann 2005). The subsidising of the German hard coal sector started with the "coal crisis" in 1958, when the costs for domestic coal rose dramatically compared to the world market level. In the period 1958 to 2002, the survival of the sector depended heavily on subsidies from the Federal Government and the mining *Bundesländer* totalling 157.7 billion Euros through public budgets and specific funds to guarantee a viable mining sector. The Federal Government accounted for 52% of the subsidies, 33% came from the fund "coal penny"[43] whereas the *Bundesland* North-Rhine Westphalia (NRW) granted 14% (Storchmann 2005:1473-1475).

The policy to prioritise the coal sector led to a remarkable increase in the importance of hard coal in power generation. From being the smallest one, power generation turned into the biggest coal consumer compared to the heating and the steel market (Storchmann 2005:1473). Despite the intention from every Government since 1966 to reduce the subsidies, coal aids peaked in 1989 with 7500 million EUR per year and remained at very high levels until the mid 1990s (Storchmann 2005). Since 1996, the aid has steadily declined, and in 2008, the joint coal aid from the State and NRW will be almost 2400 million EUR per year. In 2007, the state and Bundesländer agreed to end the subsidising of the hard coal sector by the end of 2018. The decision implies that from then on, the domestic supply of hard coal will

[41] http://www.bmu.de/ueberblick/atomenergie_strahlenschutz/doc/41319.php (10.07.08)
[42] http://www.bmwi.de/BMWi/Navigation/Presse/pressemitteilungen,did=262826.html (10.07.08)
[43] The "coal penny" was a special fund outside the public budget financed by a coal levy on the price on electricity, and thus financed by all electricity consumers. In 1995, it averaged 8.5 % of the price on electricity. In 2002, sales aids accounted for almost 95 % of all coal subsidies.

only contribute to Germany's energy production to a very small degree, as the domestic production can be replaced through imports without problems.[44]

5.2.4 Renewable Energy Sources

Development of renewable energy in Germany has become an increasing priority for German policy makers at national as well as regional level since the mid 1970s. Whereas the period between 1974 and 1989 almost entirely comprised research and demonstration measures, the time afterwards is characterised by major market creation and stimulation measures (Bechberger & Reiche 2006). This has resulted in a remarkable expansion of the renewable energy sector (see also chapter 4.4.1). In 2005, Germany occupied a world leading position in installed wind power with 31% of installed global capacity, and showed the strongest growth in newly installed photovoltaic (PV) – sharing first position with Japan in totally installed PV power capacity. It also ranked first in the production of bio fuels and installed solar thermal collector space in Europe. The German market for the latter is the biggest and most rapidly increasing one in Europe. In 2007, renewable energy sources accounted for 8.5% of total primary energy consumption and 14.2% of electricity consumption in Germany. Only two years earlier, the numbers were 4.6 and 10.2% respectively. Wind power increased by 28.7% from 2006 to 2007, and PV by 59.1% (BMWi 2008).

Bechberger & Reiche (2006) identifies the successful RES development as a result of the following different driving forces: 1) the Renewable Energy Sources Act (EEG); 2) a comprehensive RES promotion approach with a lead market focus; 3) external pressure deriving from European and international commitments in RES policy and active climate protection; 4) a positive cognitive environment towards RES and 5) certain technical driving forces. The first point mentioned above is maybe the most important. One of the German Environmental Group interviewees talked about the EEG as a splendid and well working instrument for the development of RES. The EEG is a promotion instrument with feed-in tariffs used in Germany, Denmark and Spain, the leading wind energy countries in Europe. Almost 78% of EU-25s wind power capacity was installed in these countries by the end of 2005. Feed-in tariffs guarantee investors a specific support for a certain time period. The size of the remuneration and the duration of the support period depend on what technology is used. This makes it possible to reach a broad technology mix. Germany has promoted renewable energy with feed-in tariffs since 1991. The EEG is designed such that the supply companies

[44] http://www.bmwi.de/BMWi/Navigation/Energie/kohlepolitik.html (10.06.08)

are obliged to purchase the RES electricity and then pass the costs through to the consumers. Examples of the amount of the feed-in tariffs/kWh are 9.67 cEUR for Hydropower up to 500 kW, 6.65 over 500 kW to 5 MW for a period of 30 years. Onshore wind energy receives 8.36 cEUR in the beginning, followed by 5.28 cEUR as a basic tariff. Photovoltaic energy is granted approximately 50 cEUR. The idea behind feed-in tariffs is that with extended deployment of the new technology the operating costs decreases thanks to learning effects (improved technology). This can be measured with the corresponding progress ratio or the learning rate (Neij 1997). The Norwegian Government also considered the introduction of a common system for feed-in tarifs for development of RES with Sweden. When negotiations failed, the feed-in system was postponed indefinitely. As a consequence, the Norwegian level of RES support is much lower than the German level.

The second force identified by Bechberger & Reiche (2006) is Germany's ambition of becoming market leader, which implies the state's willingness to bear the initial risks and development costs of the innovations until they reach market competitiveness. The successful development of RES and the fact that RES have become an important economic factor is considered as an evidence for Germany's official market leading ambition. The Ministry of Economics and Technology also terms development of RES as a central aim of the Federal Governments energy policy. The total turnover for German renewable energy industries in 2007 was 24.6 billion EUR, an increase by almost 10 % from 2006. The total number of employees within the sector was 249.000 by the end of 2007. The German RES policy is based on a mix of several measures. In addition to the EEG, there are other supporting programmes like the 100 000 Roof PV Programme and the Market Incentive Programme (MAP) with direct investment subsidies and soft loans.

The European Union has also contributed to the promotion of RES in Germany through the Directive 2001/77/EC which stated that all EU member states should increase RES electricity consumption from 13.9% in 1997 to at least 21% in 2010. Germany's individual target was set by 12.5%, starting from 4.5% in 1997. The target is already attained, and Germany is thus one of the few EU member states to reach its goal (Bechberger & Reiche (2006).[45]

[45] http://www.erneuerbare-energien.de/inhalt/41019/, http://www.german-renewable-energy.com/ (10.06.08)

5.3 Concluding remarks

The interaction between state and industry actors in the energy sector goes back to the 19th century in both Norway and Germany. The state has played an active role in the development of the sector as owner or partly owner of power stations, energy companies and transmission grids. It has also been important as investor in new constructions and through subsidising research and development. In Germany this is the case for coal production in particular, but development of nuclear energy has also been granted considerable financial support. Norwegian petroleum production has also been largely dominated by the state since the first findings were made in the North Sea in 1969. To ensure active participation in the petroleum sector on all levels, Statoil and SDFI was established in early 1970s.

These were intended political decisions based on the energy system's importance for the society. State ownership within the electricity sector remained more or less stable up to the liberalisation of the sector in the 1980s and 1990s in Germany and Norway respectively. Most of the German energy companies were privatised, and a large part of them merged. In 2008, the four largest companies dominate 80% of the market and control the transmission grid to100%. The interaction between public and private actors in Germany has nevertheless continued, to a large degree in the form of lobbyism. In Norway, public ownership still dominates the energy sector, but the role of state and municipalities has changed. In the 21st century, the Norwegian state's presence in the energy sector is above all as a major shareholder in energy companies that have turned into profit oriented companies on the international market.

In both countries, it is well documented that energy and petroleum companies lobby towards the energy bureaucracy. The role of the state in the development of RES takes place first of all through financial support to developers. These support tariffs are much higher in Germany than in Norway, which have led to a considerable development within this sector over the past ten years (see chapter 4).

6 Empirical findings

This chapter presents the empirical findings. The field work was conducted according to my first two research questions, which aim at examining climate perception and its implication for personal behaviour. Chapter five reveals that extensive cooperation between public and private parts of the energy sector is the case. I nevertheless discovered large differences in the sectors climate perception during the gathering and structuring of the empirical data. As accounted for in 3.1.2, it was possible to organise the interviewees from the public sector into two groups of institutions, which I termed public/energy and public/environmental group. A third group represents the interviewees from private sector. In the following sections, I shall present the climate perceptions found in Norway and Germany group by group. The discussion about differences *between* the groups takes place in chapter seven, where the main analysis is conducted. According to explanation-based theory, the structuring of empirical findings into groups of institutions is nevertheless also an analytical performance, as new terms are established that build a base line for the presentation and the further analysis of the data gathered in the field.

Several dimensions of disagreement among the interviewees could be located:

1. Whether climate change (CC) is anthropogenic and avoidable
2. Whether national energy policies are reasonable in relation to climate change
3. How is the distribution of responsibility and the role of the individual when it comes to mitigating climate change
4. To what degree CC will affect society and the interviewees' daily lives
5. Whether CC is perceived as a threat that they worry about.

The interviews are hence categorised and presented with respect to the following categories:

A. IPCC's prognoses
B. Consequences of CC
C. Energy policy versus climate policy
D. Personal responsibility and behaviour
E. Worry
F. The strategy of the company (for the private group only)

6.1 The public/environmental group

The interviewees in this group were:
Norway: Martha, Karen and Sara.
Germany: Karl, Paulina, Bill and John.

A. IPCC's Prognoses

The members of the public/environmental group were all convinced that climate change is taking place and that it is a serious problem. They argued that the IPCC is a very credible and serious panel of scientists from all over the world. Several of the interviewees in this group gave detailed accounts for the work process of the IPCC, to illustrate the scientific validity of IPCC's work. "I do not know any other topic worldwide that scientists all over the world discuss and validate, with such continuity over decades," Karl said. Some of the Norwegians mentioned that the prognoses are frightening. They also believed that the prognoses are rather conservative, "because of the way the IPCC reports are produced where they have to attain consensus between different researchers from all over the world" (Martha). Both Martha and Karen thought climate change was happening faster in reality than what is communicated in the media. One reason for this was the melting of the ice caps in 2007 that happened much faster than predicted by the scientists. Bill also thought the estimations for temperature increase were set too low, based on the experiences from 2007 when "the prognoses for temperature increases were set higher over and over again." John argued that with 95% probability, there is no doubt around the basic problem anymore, i.e. whether we humans are responsible for it or not.

B. Consequences of CC

When asked about consequences of CC for Norway, the Norwegian interviewees in this group listed the following: Changes in weather, i.e. more precipitation, more often and more intense rain and more storms. We may have to regard these factors when we build new houses and infrastructure in the future. Also when it comes to energy production, we may have to introduce new criteria for construction dimensioning, which again will involve remarkable societal costs. CC will affect our glaciers and the geological situation because of changed risks for landslides, which will affect settlements with regard to where we can settle and increased risks for existing settlements. Warmer temperatures will have consequences for our fishery, as fish stocks will move. An intensified climate policy will among others cause changes within the transport sector, for example through increased fuel prices. Martha

reflected upon the possibility for a change in the industry structures, which may lead to a closing down of polluting production units. There were agreement that Norway will not be among the worst affected countries in the world, and that it will probably not be hit by droughts and loss of harvests as is the case for many other countries. All interviewees regarded it as likely that we must be prepared to receive refugees from harder affected countries in the south in a long term perspective.

The German members of this group emphasised that Germany will not be the hardest affected country. However, there will be national consequences in terms of more extreme weather, warmer temperatures, new species occur while other disappear and melting of glaciers in the alps that lead to lower water level in the large rivers, they said. Some of the interviewees accounted for the prediction that different parts of the country will be differently affected. The southern and western part will have more rain and floods, whereas the northern and eastern part will rather have a problem with drought. Bill doubted that it was possible to foresee different forecasts for different regions, but he agreed with the others that it gets warmer and that flora and fauna are changing. Changes in the natural environment will have consequences for forestry, agriculture and water supply/distribution. The German interviewees expected that this will lead to increased national economic costs. John foresaw that the insurance sector might refuse to ensure people living in certain areas because the risk of living there will become too high. The German public/environmental group also stressed the risk of international instabilities because of climate change. If nothing is done to mitigate climate change, it will probably come to huge migration movements because many areas will not be habitable. We may experience water shortage, food shortage, energy shortage and this may even cause wars. Several of the German interviewees were therefore very enthusiastic about the fact that the Nobel Peace Prize 2007 was given to Al Gore and the IPCC. "It was a genial decision, because it made clear that climate protection is peace policy. This connection is strong," Karl said.

C. Energy policy versus climate policy

The public/environmental group expressed general satisfaction with the national climate policy, both aims and measures, in their respective countries. Some of the Norwegians argued that the Norwegian aims are more ambitious than those of the EU. However Karen expressed discontent with the support level and regime for development of renewable energy. She argued that Norway has a large potential for renewable energy, but because of low financial support, a lot of projects are not realised. Sara was satisfied with the increase in support for

the restructuring of energy use in private households and industry, and with the ambition to increase the public financial support for research and development on RES twice by 2010. The Germans characterised the German climate policy as ambitious, but considered this as positive and necessary. The policy has lead to a massive development in the renewable energy sector, both within Germany and for export purposes. Several of the interviewees referred to the McKinsey-study (see chapter 4.2.2) and the calculations made there, which show that several of the reduction measures actually pay off when they are carried through. John also talked about another study made by Vattenfall, which illustrates that there are other barriers for emission reductions than economic costs; lack of information, institutions are not designed/constructed for energy saving, legitimate and administrative barriers.

The Norwegians were optimistic on behalf of Norway's odds to reach the announced target which proclaim that emissions will be reduced with 15-17 million tonnes by 2020. The Norwegian Government has not yet composed the final package of measures that ensures that Norway will attain the prescribed emission reduction, but the Norwegian interviewees were moreover optimistic that the aspired reduction will be accomplished. "We do not have a full overview now of what possibilities for reduction we will have in 2020," Martha said, thus implicating that there will be new possibilities for emission reductions in the future. Karen started out being optimistic about Norway's capability to undertake the announced reductions, but then hesitated after thinking it over again, because "2020 will be here in a very short time."

The majority of the Germans were also optimistic about that Germany will reach its aim of cutting emissions with 40% by 2020. The German interviewees held this for possible, but emphasised that this presupposes political will and action. "It will not happen by itself", Paulina said. Bill was the only one who was pessimistic about Germany's chances for achieving its ambitious reduction aims, "of the simple reason that we had an increase in energy consumption and CO_2 emissions in the last years." He also thought that many of the measures will be expensive, and even though Germany will have the money for them, he questioned whether it will be possible for the politicians to execute the planned changes: "I am a person who is ready to do more to reach the aims. We have a responsibility to reach them, also towards coming generations. But a politician thinks and speaks differently because he always has to be elected." Bill nevertheless found it exclusively positive that the Government goes "quite far" in this direction; "One must set the targets and try to reach them, but I do not believe that we will". John was convinced that the energy consumption will

decline, for two reasons: Firstly because of the increased focus on CC and energy efficiency and secondly because of the rise in energy prices.

In both countries, there was agreement that it is important to cut emissions nationally, even though it may be less expensive to cut them abroad. The following arguments were mentioned to justify this opinion: It is important to show that we take responsibility for our own emissions – if we just buy quotas it has a very bad symbolic effect. It is also a demand from developing countries that developed countries take their share. According to the IPCC report, the cut in emissions globally must be so comprehensive that developed as well as developing countries must undertake reductions.

Some interviewees argued that if there was a perfectly functioning CO_2-market and a global price on CO_2 these national aims would maybe not be necessary – but this is not the case. Others claimed that one can not act only according to economic rules in international politics. Especially the Germans emphasised that national emission reductions are extremely important to mark internationally that such a policy is necessary and possible. Germany's climate strategy will serve as an example for the rest of the world that it is possible to reduce emissions without economic loss. All German interviewees mentioned the fact that many of the measures are profitable. John and Karl accentuated the conclusion of the Stern report; that the price of CC is much higher than the price of mitigating it. Those two were also eager to convey that climate protection is rather a possibility for the economy than an obstacle. "The renewable energy sector is in the meantime the most successful and growing sector of the German economy," Karl said. National emission reductions may also be important for technology development in Norway, in order for the country to develop a research effort in the field of renewable energy. This may have an effect for the future Norwegian economy, one which is difficult to include in the calculation of the costs of emission reduction. The Norwegians argued that it is important for Norway to develop new industry for the time after the production of oil and gas has ceased.

D. Personal responsibility and behaviour

> This is very difficult. How much personal responsibility has people in rich Norway for starving people in Africa?" Interviewer: "But in this situation we can contribute a little bit more?" "No we can not. It is a global problem. I can not personally make sure that the world's emissions are cut with 50 – 80% by 2050 (Martha).

When asked about personal responsibility with regard to mitigation of CC, the interviewees in this group were clear about that the individual has a responsibility. The group was divided about whether the main responsibility lies with the authorities or the individual. There was the

opinion that one can do a lot through more conscious behaviour and reduce where it is possible in one's everyday life. At the same time, many of the interviewees stressed that the authorities are responsible for facilitating measures so that the citizens can make climate friendly choices in their everyday life. Social structures are very important for what we are able to do. Martha hence claimed that the individual's main responsibility is as a voter, and that it is the duty of each citizen to ensure "that we have the politicians that enforce the necessary political action."

One of the Germans held personal responsibility to be the main issue when it comes to mitigate climate change. Bill argued that "everybody has to ask themselves where they can save energy in their daily lives." He regarded it as a basic responsibility that every citizen has. According to Bill, the personal responsibility must come in the first place, and subsequently comes the responsibility of the authorities and the politicians.

Some of the interviewees addressed the dilemma that the citizens as consumers are limited to choose the possibilities that are available on the market. If there is no adequate public transport system, it is difficult to restrain from driving a car, Paulina said. On the other hand, John claimed that "the market is for the consumers and produce only what they demand." In general, there was the belief that the citizen has power as a consumer, and that she can choose energy saving solutions in all areas of his daily life. John described each individual's possibilities to reduce GHG emissions as "immense", and lists up a long row of things she can do. The German interviewees nevertheless did not believe that people will change because of climate change, but because the prices on energy has increased, and will continue to increase.

When it came to what they can do themselves, most of them had reflected a lot around this. Many of them gave detailed accounts for what they do and could have done, and also for discussions in their every day life on the topic. Karen explained how energy consumption has become a much more debated issue in people's lives, and that people are much more conscious about this now than just a few years ago. Above all, this is centred on energy saving. John told that his family managed to cut the energy consumption in their household with 30% through mobilising the whole family. The Germans all travelled mainly by public transport, and they had purchased energy saving lamps and other electric devices. Bill would like to buy a "passive house" and expected to live in one in 20 years from now. The dependency on cars was for most of the Norwegians the biggest contributor to GHG emissions in their private life. At the same time they described it as very difficult to abandon, due to the lack of adequate alternatives. All interviewees expressed willingness to abstain

from goods because of climate if necessary. Bill was also very sceptical about air travel. He expressed severe concern for the development in this sector:

> I find it catastrophic that we have these cheap airlines where you can travel for 35 Euro to Tenerife. It stands in no relation to the damage one causes. […] And how can I, as society, say: I do not care, I want to have fun, I party as long as there is oil, it will be possible another 20-30 years and what comes afterwards, my children or the Third World do not interest me. It simply does not work.

E. Worry

Within the Norwegian public/environmental group, all interviewees expressed worry. Above all, they are worried on behalf of the next generation and their children. "I am also worried in a North-South perspective, because I see this creates a lot of misery in the world. It is pretty awful what we see is about to happen," Martha said. Karen said that she finds it difficult *not* to worry because "there are so many signals, alone by looking at the weather. It looks like there are a lot of changes going on, all over the world. It is frightening. It is accelerating".

The Norwegians were nevertheless optimistic on behalf of our ability to do something to change the development. Sara told that she knew people that are very worried, but that her own reaction is rather that she wants to do something about it, that she gets the feeling "we are going to make it!" Martha argued that according to the IPCC the technology to undertake necessary emission reductions is available: "What lacks is political will from the world's leaders."

The German interviewees did not worry about climate change directly. This was because they did not believe it will affect Germany and themselves personally, at least not in many years still to come. "We in industrial countries will probably be affected […] but not threatened in the meaning that we will be deprived of our life foundation," Paulina said. Few of them thought that CC will be noticeable for them personally. "Here in the city we will not notice it very much. We have an old apartment in an old house with thick walls," Karl said. The reason to mitigate climate change is not because of the threat towards themselves, but because of the responsibility towards countries and people who are worse off. The majority mentioned the possibility of future wars as a result of climate change, which was perceived as scary, but not as a personal threat. Bill's description was denotative for the whole group:

> I think many see it as I do: CC will not affect Germany that directly. Many people are not sad that the winter is no longer that cold. Everybody is happy when the sun is shining, when the summer is warm, most people I know go out, drink a beer and do not find it bad that there are more sunny days than there used to be. Climate change for us now, in our daily lives, is not that bad.

6.2 The public/energy group

The interviewees in this group were:
Norway: Torben, Alex, Sylvia and Eric.
Germany: Chris, Robert and George.

A. IPCC's prognoses

The Norwegian members of the public/energy group were divided in their view on the IPCC and their prognoses. Half of the group assumed their prognoses are correct, but Torben added that he did not have any personal opinion about them. Torben also told me that he used to be a "climate sceptic", but that he had changed his view because of the Norwegian precipitation development, which for him was an indication that climate change is taking place. The other half of the group shared the view of the German interviewees, who were uncertain whether the IPCC's prognoses are realistic and credible. Eric said directly that he did not believe in their predictions. Sylvia said she held IPCC to be a serious research panel, but she did not believe it would get that bad as they foresee.

Most of the Germans emphasised that they could not evaluate the findings themselves, but they doubt whether climate change will have the consequences that the IPCC foresees in their 4th assessment report. Chris doubted whether manmade CO_2 emissions can eventually cause such changes in nature and hence whether it would be possible to stop the ongoing trend by reducing GHG emissions. George stressed that he would not say that IPCC's prognoses are wrong, but pointed at the impossibility of making prognoses of nature. He argued that these prognoses are based on models, which is always a simplification of reality. The topic was apparently a controversial issue for the German interviewees in this group. Robert argued that "there are also others who say something else. But it is not allowed to discuss such facts anymore, because IPCC has turned into the board of inquisition. I always find it problematic when someone says he has the final truth." The majority of the group pointed to the matter of fact that the climate has always been changing. Therefore, we can not necessarily relate the changes we now observe to anthropogenic GHG emissions.

B. Consequences of CC

When asked about the consequences of CC, the interviewees in the public/energy group responded differently than the climate group. They were all aware of the predictions of the climate researchers, but where the public/environmental group said "*it will get warmer,"* the public/energy group used such formulations as: "We will allegedly get more and heavier

rain." "Allegedly, it gets warmer." "We will probably have rougher weather." The German interviewees were sceptical about that climate change will lead to specific changes in the natural environment or for the society. George argued that "things will change, but in what direction and to what extent one can not say, in my opinion." Chris said "I still regard the incidences that have occurred within the last years more as weather events rather than a climate topic". The Germans expressed scepticism about the assumption that climate change will lead to catastrophic-resembling circumstances. "We do not know if it will become that dramatic," Robert said. All of them thought Germany would be one of the least affected countries when it comes to changes in the natural environment. They argued that the changes would be of such a character that it will not affect Germany's inhabitants noticeably.

Torben said that if the IPCC are right in their prognoses, there will be huge changes in the world, but for Norway isolated it won't necessarily be that bad. There will probably be an increase amount of asylum seekers who are climate refugees. Eric said that flora and fauna will change; "but again – it always has. Therefore, it will not affect us very much, and we will manage to adapt." The majority of the Norwegians argued that what would really affect us is if the politicians force different climate measures upon us that could become very expensive and dramatic. They thus believed that the social and economic consequences will become far more significant than the changes in climate and weather themselves.

C. Energy policy versus climate policy

> If we are going to achieve 20-25% emission reduction compared to today's emissions, we depend on a technological breakthrough. If we do not manage to get the technological solutions, it will cost a lot of blood sweat and tears, and I do not think the Norwegian society is willing to do that. Then I think we should rather buy quotas abroad. If we are going to solve the problem we have to cut emissions where it is cheapest (Torben).

The interviewees in the public/energy group were very critical about the climate policy in their respective countries. The Norwegians characterised the Norwegian policy as a symbolic policy and a policy of indulgence. "It is very convenient to set aims for 2050," Alex argued. The German interviewees described their national climate policy as very ambitious. They expressed the opinion that if one really believes GHG emissions is a serious problem, one should act accordingly. The proposed measures were nevertheless regarded as very difficult to achieve because the reduction potential in Germany is limited. To achieve such major reductions within 2020 is not wise, because one neither knows the costs nor the consequences of this policy: "In my opinion, it will be very difficult to achieve the 40% reduction aim. Our burden sharing aim is 21% reduction by 2012. 40% hence means a doubling of this aim in the

following eight years, which is a very difficult case. The 20% aim is already enormous," Chris said. He also argued that most of the reduction has happened because of the German unification. Both Norwegians and Germans shared the opinion that Norway and Germany are responsible for a very small part of the world's emissions, and even if they reduce their emissions to zero, it will not have any effect on the world's climate at all.

The interviewees further questioned the fact that Germany and Norway as national economies spend so much money on technology development, CCS in particular, which no one knows whether will be applied or is going to work or at all, while other countries do not pay any attention to climate protection. "We are building constructions for CCS at the cost of many many billion kroner. What is happening at Kårstø is madness in my opinion.[46] It is because we have too much money. So I think we do more than enough. It is exaggerated. I think the climate debate in Norway has a very national focus," Alex said. There was also severe scepticism toward both the Norwegian and the German Governments' ambitions to be pioneer countries. Some interviewees doubted that it will have any influence on other countries. "As a Chinese or Indian, the German good example would not impress me very much," Robert said.

Robert was also concerned about that the initiated climate policy will lead to an enormous rise in energy prices. He claimed that the announced climate policy will become very expensive for the consumers, and that the politicians are trying to fool the population by telling them the opposite: "This [climate policy] costs a lot of money, also for private households, which again will cause social problems. […] People talk about unemployment benefits. That is ridiculous when you look at what happens in the energy policy!"

Some interviewees in both Norway and Germany had the impression that the reduction aims were set par hazard and not based on thoroughly calculated estimations for reduction potential in different sectors of society. The quantification of emission reductions was perceived rather as a political gesture that gets a lot of attention in the media. "It is true that we have to care about the topic, but we could handle it more structured; slower and more reasonable," Robert argued. Both Robert and Chris were sceptical about the calculations from the Fraunhofer Institut that predict that the measures suggested in Meseberg would lead to a certain emission reduction: "You know there are no exact calculations. Everyone makes their own calculations […] There are no calculations without controversy and in my opinion there are no serious calculations at present," Robert argued. Chris said that "the tendency and

[46] The Norwegian Government will construct a full scale CCS facility for a gasfired power at Kårstø on the Western coast of Norway. [http://www.regjeringen.no/en/dep/oed/Subject/carbon-capture-and-storage/karsto-carbon-capture-and-storage-projec.html?id=502211] (12.11.08)

political opinion is that it [to reduce national emissions with 40%] is feasible. But it has many premises! It would mean incredible efforts in the case of [energy] efficiency. We have to increase that by 3% every year. For the moment, the figure is 1%."

When asked whether Norway could or should have put up more ambitious aims, the Norwegian interviewees understood this as a question about how many quotas we should buy abroad, not whether we should implement harder regulations and measures nationally[47]. This was mainly because they considered it as impossible to achieve the aspired emission reduction nationally. Sylvia said that to reach the aims would be possible, but very expensive and demand very tough measures that the population most probably would not agree upon. Torben claimed that the achievement of the aims depends on CCS, which "we do not know if will be applicable until 2020 because it is difficult to order research results."

The emission trading scheme and a common price on CO_2 were considered to be the best measures for emission reductions by most of the interviewees in this group, though one interviewee argued that the price on carbon has to go up if it shall have any effect. Alex could not imagine that we will have an international quota market that works in any foreseeable future because it is so complex.

In both countries, their beliefs about global possibilities for emission reductions influenced many of the interviewees' perception of the national climate policy. Chris said that "It will not be possible to attain these 450 ppm[48], I regard it as *totally* impossible. I therefore consider that what is going on as a kind of hysteria." He contrasted the global emission reduction aim with the scenarios from the IEA, which predict up to 50% increase in energy demand. "We have to have a policy that makes reason in other aspects as well. Not only climate above everything else," Chris concluded. Eric argued that because of the world's need for fossil fuels the coming 40-50 years "we [Norwegians] can not just shut off the supply," i.e., stop the production of oil. It was nevertheless his impression that the Norwegian Government understands and shares this perception.

D. Personal responsibility and behaviour

The general opinion in this group was that the individual is responsible to a certain degree, but that it is rather small things that each person can do. Torben argued: "Everybody has a responsibility to behave decently. Then again, it is the Government's and the politicians' responsibility to come up with sensible policies. But even though everybody should behave

[47] The Norwegian aim is to reduce 30% by 2020. Even though the Government has announced to undertake 2/3 of this reduction nationally, it is still disputed whether this will be feasible (See chapter 4.3.2).
[48] The IPCC has recommended a stabilisation of GHG in the atmosphere at 450 ppm CO2e (See 4.2).

decently, there are many who do not do that. Therefore, the most important is to have a price on CO2." The German interviewees agreed that each individual has a responsibility to save energy in his or her private life. Most of the interviewees in the public/energy group stressed that they were already very conscious about energy consumption in their private life, but that this was not because of the threat of CC. "It is always a good thing to have a conscious energy use," Robert said. George explained that he barely uses his car – which is very energy efficient any way, has energy saving bulbs in his whole house and does not know what he could have done to reduce emissions further.

Several interviewees argued they did not think it is the individual's responsibility to calculate his or her annual GHG emissions. The consideration to give each person a certain CO_2-quota is not considered as a good idea, and Eric characterised this as Puritanism and self-torture. George stated that it was not his hobby to save CO_2, and Chris that "I am not going to chasten myself to save some kilogram CO_2". Eric said:

> Of course everybody has a responsibility, but it easily becomes too much. I do not think about how much energy it takes to produce a product I buy, and I think it is kind of weird to do so. […] I agree that if you believe that it is necessary to reduce our energy consumption, it is the individual that ultimately does it. I just do not think that it is going to happen. We human beings are a little too far from that, I suppose."

Alex' point of view was that the main obstacle to mitigate CC is the simple fact that most people want to maximize their own standard of living. Several of the interviewees said that they will not stop flying on vacation because of climate change, and to think anyone else does is totally unrealistic. If one wants people to change anything, it has to be in their own interest in one or another way. "No one changes car when the hybrid car is much more expensive," Alex said. In contrast to the public/environmental group, which positively described all the possibilities each individual has to do something, the interviewees in the public/energy group saw these possibilities as very limited and rather moralising. This was also connected to the dominating assumption that personal behaviour is of very little importance. Alex said: "It does not matter at all what you do personally, because you do not have *any* cause-effectiveness."

In accordance with their view upon the significance of personal behaviour, the interviewees in this group told that they have barely changed anything themselves in their private lives. Most of them explained that they had always had a conscious relationship to energy use, while Alex said that what he does is rather because of economic or practical

reasons than because of CC. Many of them said that they did not know what more they could do. “I consider it a bad idea to buy a hydrogen car for 2 million Euros,” Chris said.

The majority of the interviewees in this group did not experience that people in their surroundings had changed their behaviour because of CC. “On the contrary,” Alex said; “People have more money than ever before and the private consumption keeps increasing.” Sylvia claimed that because of what she termed a rather hysterical climate debate in the media, many people she knew say that they do not believe in climate change at all. Torben was more optimistic about a change in public opinion. He thought that “people are thinking about these things, but not very much.” He had noticed that people buy more effective cars and drive together with friends to a larger degree than before.

E. Worry

This group was the least worried of all three groups. Some of the interviewees did not worry at all, because they did not believe it will happen as bad as predicted. Some said they believe that we will solve the problem, and that if these things happen, they will happen so slowly that we will manage to solve the problems as they occur. Torben questioned the urgency and scale of the problem as presented in the media: “I do not think it is the world’s largest problem as Jens [Stoltenberg, the Norwegian prime minister] says, because there is a lot of war and hunger and diseases in the world. But if it gets really bad, if it becomes 8-10 degrees warmer, it will become really horrible many places, and many things can happen, old diseases can occur again etc.” There was also the opinion that we can not do anything about it anyway – neither individually nor as a society. Chris said: „If there really is a change in climate I do not think we will be able to do something against it anyway“. He admitted that his point of view is an egoistic one: “In Germany it will not be that bad anyway. […] I am pessimistic with regard to the population outlook and therefore I say to myself: So what?”

6.3 The private group

The interviewees in this group were:
Norway: Thomas, Fred and Elisa.
Germany: Simon, Michael and Peter.

A. IPCC’s prognoses

The private group all agreed that the IPCC is a serious research panel and that their prognoses are credible. The Germans nevertheless emphasised that they did not have the competence to mean or think anything else. The majority of the interviewees in the private group gave

detailed accounts of the content of the 4th assessment report and the fact that it states with increased certainty that anthropogenic climate change is happening faster and stronger than presumed in the previous reports. The private group was well informed about the IPCC's work and perceived CC as a serious problem. The interviewees agreed that the climate researchers are now more certain in their statements, and pointed to the fact that observations show that CC is already taking place.

Some of the Norwegians characterised the development as frightening. They also believed that CC will become worse than the IPCC predicts: "you can perhaps multiply it [the prognoses] with ten?" Thomas said. He had been to many meetings and conferences during the last year and met with specialists on the topic, who claim that the situation is much worse than what the IPCC says. Thomas argued that it is a fact that IPCC is always a little delayed in their statements because all involved parties have to agree upon every statement they make.

The Germans did not mention whether they thought it will be better or worse, but they expressed scepticism towards whether it will be as bad as it is often presented in the media, where "the world is either threatened by collapse or it is not a problem at all," Simon said. Instead, the general attitude was that CC is a problem, which we have to do something about, but we can do it and the world will not go under. They therefore thought the discourse in the media was dominated by hysteria.

B. Consequences of CC

There was agreement about that Norway and Germany are not among the worst positioned countries in the world in terms of consequences of CC. The German interviewees did not think CC will be dramatic for Germany. The changes in the natural environment will not be impossible to cope with, and Germany has the money to undertake the necessary adaptation measures. The Norwegians too did not perceive the situation as directly threatening for their country. They argued that Norway will probably not suffer from droughts. Instead, there will be more rain and more extreme weather as storms and the like. "But if the sea level rises with six or seven meters, it will be really bad for Norway as well," Thomas said. Some of the Norwegians mentioned that Norway may profit on CC because the agricultural sector will experience improved conditions. Also for the Norwegian industry it may be advantageous because Norway has a lot of clean energy, access to new technology and money to invest in research and development. Some of the power intensive industry may suffer, but other types of Norwegian industry may see this as a business idea.

The Germans believed that the major implications for Germany will be rising energy prices which lead to more energy saving and efficiency. This is already a hot topic for many people. Michael was therefore more concerned about the societal consequences than about changes in the natural environment. He also felt that the costs of the projected energy policy and the fact that energy will become much more expensive were under-communicated from the Government. He therefore believed that energy efficiency will play a larger role in his life and in the society in general.

Distribution and justice questions were brought up by all interviewees. Fred questioned whether one can allow oneself to look at the consequences for Norway alone. Thomas said there may be more refugees coming, epidemics and changed economic circumstances. Because the world will be negatively affected, this will influence Norway and Germany as they are parts of a globalised world. Most of the interviewees mentioned the possibility for wars as an indirect effect and the understanding that climate politics is peace politics was also reflected upon.

When it came to consequences for their own lives, the attitudes were diverging. Some of the interviewees did not believe that CC will affect them in their life time, whereas others said that we do not know what the consequences will be and mentioned the risk of that it could become really bad.

C. Energy policy versus climate policy

The interviewees in this group were quite dissatisfied with the climate policy in their respective countries, but Norwegians and Germans for different reasons. The majority of the Norwegians held the view that there has been a lot of talking and little action. Thomas characterised Norwegian politicians as weak and coward, because "they are doing so little." He drew a parallel to Sweden, where half of the heating demand is covered with district heating based on bio energy – in Norway the figure is 3%. Fred argued that Norway's policy is above all directed by the EU, and that we as a non-member have very little influence on EU's climate and energy policy. "To compensate, we should have a lot of lobbyists everywhere possible in Brussel, and we do not have that." In Fred's opinion, the most important thing Norway could do in order to have a more ambitious climate and energy policy is to increase its influence in the EU.

The Germans characterised their national policy as very ambitious, but also as contradictory. Michael argued that on the one hand, the politician's main policy measure for the electricity sector is said to be the emission trading scheme. On the other hand, 52% of the

electricity market will be directed by subsidies by 2020, as 27% will be covered by the Renewable Energy Act (EEG) and 25% by the Act of Combined Heat and Power. He also criticised that some measures first of all promote the implementation of certain technologies, instead of aiming at improving efficiency. Simon argued that it is not possible to have a cost efficient climate policy if you want to abolish nuclear power. The Germans believed that a 40% by 2020 would be possible, but argued that it will be very expensive and questioned where the money is going to come from. Therefore, they doubted whether this aim is reasonable in an economical perspective. Peter said that the reduction aims for 2020 are unnecessary, unreasonable and way too expensive. The reduction aim for 2050 is something else, Peter argued: "Until 2050, we have much more time. This is very important for the energy companies, because it takes a long time to change the energy production systems. For us, 2020 is so to say the day after tomorrow". Michael suspected that the climate policy is part of the election strategy.

The Norwegians also doubted whether Norway will reach its emission reduction aim within 2020. The reason was above all insufficient public support levels for renewable energy and environmental friendly solutions. Elisa described cutting emissions with 20-25 % as demanding, but possible. "It nevertheless presupposes a totally different will for action", she said. All Norwegians agreed that the policy for renewable energy and energy efficiency in Norway is too weak.

> With current measures I do not think it [the announced emmission redcution] is going to happen. We are not even close to anything happening – nothing is going to happen at all! So I do not believe in that. Of course, they *could* introduce measures that would make things happen. But I have difficulties to see it coming (Thomas).

The Norwegians shared the opinion that it is important to cut emissions nationally, but if you can do it much cheaper abroad, it is not necessarily wise to do everything at home. "In a strict economic perspective, of course it would be more reasonable to cut more [emissions] abroad. But I think this is a question where you can not only have an economic perspective. […] One thing we can do is to develop technology and possibilities that can be used all over the world," Elisa said. She argued that the politicians so far has focused more on Norway's role in international negotiations than on what we can do nationally: "I think the will to act in Norway is small. The will to think international leadership is positive".

Contrary to the Norwegians, the German interviewees were rather sceptical about Germany's ambition to be a pioneer. "It must not go too far," Simon said: "The other countries must be able to follow." Michael agreed that it would be better to get the other

nations onboard instead of marching in front. They therefore thought it would have been better if the EU had played the role of pioneer instead of Germany alone. Michael perceived the EU reduction target of 80% reduction by 2050 as extremely ambitious, but argued that according to the IPCC, it has to be. He said it is important that the politicians set such long-term targets, among other things because of the emission trading.

D. Personal responsibility and behaviour

Within this group, there was a general opinion that the individual has a responsibility to do something. Some said they were uncertain how hard one should make the personal moral. Everybody can become more conscious, but the main responsibility lies with the political laws and strategies. "If we thought that it would solve the problem when each of us pulled ourself more together – forget it!" Elisa said. But she also addressed the individual's power as a consumer, and argued that we as consumers have a responsibility to demand energy efficiency from companies and the products we buy. Some of the German interviewees argued that because each person contributes very little to climate change, the individual can not do very much with regard to reducing GHG emissions. They nevertheless emphasised that the individual can do a lot if she acts as a good example and informs other people about the problem.

Peter addressed the problem that there are many people who do not care about climate change at all. There are also many people who are not able to do so, above all in developing countries but also in Germany, he argued. So to try to mitigate CC over lifestyle change is not very reliable. "It takes a very long time and one can not be sure that it will have the prescribed effect." People do not want to abstain from their standard of living, and this is also not necessary, he argued. What we can and should do, is to use energy more efficient and cleverer, and construct high-efficient climate friendly and affordable energy systems. Such a strategy implies case-oriented solutions adjusted to each target group. "There is no one-size fits all. There is not one thing that solves everything. Politics always likes that, but there exists no such thing," Peter concluded. Fred too was convinced that we have to combine increased consumption and economic growth with increased efficiency and cleaner power production, rather than to encourage people to reduce their consumption. Some of the Norwegians disagreed about this and argued that we as citizens have to consider if there is anything we can do less of.

All interviewees in the private group had reflected on what they could do to save GHG emissions in their private life, but it had not had effectual consequences for all of them yet.

Some of them gave detailed explanations about what they did and could do in their private life to save energy and climate gas emissions. They mentioned alternative ways of heating, buying an electric car or a passive house, to travel less by airplane, to narrow personal consumption and to abstain from a big house. Michael said he pays attention to his inside temperature and travels by train when this is possible. Fred was first of all willing to pay more for things because of the climate. Peter had good consciousness with regard to his "climate footprint", and did not see any large need for action in his private life as he has no car, does not travel by plane and the apartment he lives in does not belong to him – which means that he can not insulate it. The private group was nevertheless not as idealistic as the public/environmental group.

E. Worry

There was a remarkable difference between Norwegians and Germans when it came to how worried they were about climate change. The majority of the Norwegians expressed that they were sincerely worried. "I probably think about it every day," Thomas said. All Norwegians were considering what this may mean for their own children, and this was one of their main reasons for concern. One of the Norwegians did nevertheless not worry personally, because he did not think CC will affect him the next 20 years.

All of the Norwegians argued that in a longer perspective, climate change will have a real effect, *if* we do not manage to solve the problem. Still, they were optimistic on behalf of man and the earth's ability to cope with the problem. There was the belief that a big part of the problem can be solved with new technological solutions and competence. Elisa and Thomas definitively thought they will experience severe changes in the time coming, and Thomas believed that he will be surrounded by more misery. Other consequences mentioned were increased insurance costs.

The German interviewees in the private group were not worried for climate change in itself, but for the societal consequences it may bring about. However, Simon was certain that man will find a solution. But we must be ready to give up things that we have become used to, for example to sacrifice areas where we used to live, i.e., islands or valleys, he said. The general perspective was that Man is an evolutionary being who has to adjust. "The ones who do not adjust will die," Michael argued. Peter did not worry about CC, but about what lies behind it, what he termed a not-sustainable economy. He talked about the increasing world population, global injustice and that developing and newly industrialised countries are demanding their "place in the world". These social factors are scarier for him than CC itself.

Peter did not believe that the consequences will affect himself during his lifetime. He nevertheless believed that it will affect his children, and that for them it may become difficult – again not because of climate change, but because of the immense inequalities between rich and poor in the world.

F. The strategy of the company

The German and Norwegian companies all claimed that they had a climate strategy, but the design of it varied considerably between the countries. All the German energy companies had an agenda for informing their employees, either with large information campaigns or information in inter- and intranet. Two of the German interviewees reported that there are major discussions within the company around the topic. "Everybody should know about it, because the firm is a major emitting unity," Simon said. One of the German companies did not have a large program for informing the whole company, but they have a group which meets and discusses regularly.

Not all Norwegian companies were that far when it came to informing their employees, but they said they are working on it. Some mentioned that they had, or planned to have, arrangements to inform their employees, where they for example would invite lecturers. The Norwegian companies also had measures to reduce emissions on the work place, and mentioned electric cars and energy efficient office buildings. The German energy companies did not have programs to encourage climate protection and energy saving at the work place. The German interviewees explained that this was because the amount of CO_2 emissions from their office activities is negligible compared to the emissions from the company's main activity – energy production. Therefore, their strategy and focus is to improve the standards within the electricity production. Because, as Simon stated: "We do not want to do green washing, we want it to be serious".

7 Discussion

My first research question aims primarily at examining *perceptions* of the climate change situation. To bring out the interviewees' perception, I asked them questions that touched upon several aspects of climate change (CC) including climate policy, scientific findings and consequences for personal life and behaviour. In chapter six, the climate perceptions found in the empirical field study corresponding to research question 1 and 2 were presented. In this chapter, I analyse different aspects of these findings and discuss possible explanations for how and why climate perceptions varied as they did in the sample. As mentioned in chapter 3, I operate with an extended notion of *perception*. It includes changes in natural environment as well as the companies' climate strategies. Section 7.1 accounts for the main findings related to research question 1. Here I discuss the climate perceptions that I found in the different groups of institutions, and point at in what respect climate perception varied with groups, nations and gender. I also discuss variances that occurred within the respective groups. Section 7.2 investigates the findings related to the second research question, as it examines what implication the interviewees' climate perception had for their conception of personal responsibility and behaviour. The next section 7.3 recapitulates the findings from the historical part in chapter five, and is hence a response on the third research question, which endeavours at examining inter-linkages between public and private actors within the Norwegian and German energy sectors. Finally in 7.4 I discuss possible explanations for why the different groups held the climate perceptions that they did. The finding that the interviewees' climate perception diverged according to their group belonging was a result of this thesis' *exploratory* research design, and was not directly addressed in any of the three research questions. In order to explain the distinctive group features, I first of all draw on the findings from the *Local Research Frontiers* and underpin them with institutional theory and rational choice theory.

7.1 Climate perceptions

As stated in chapter one, the assumption behind the formulation of the primary research question is that perceptions matters for how people eventually act, in line with "the Thomas' theorem": If man defines situations as real, they are real in their consequences (Collins 1994:261). George from the public/energy group reacted about the way I formulated the questions during the interview, as I several times used the term *believe* during the interview. Among other things, I asked the interviewees whether they believe the climate predictions are

real or whether the national climate politics will lead to increased emissions. George argued that it was not a question of believing or not, but about scientific methodology. He taught me a lesson about scientific modelling and argued that a computer model can never simulate nature because of nature's complexity. In his opinion, IPCC's predictions were not something you could believe are true or false, they are simply mathematical models. George is of course right about that there is no final truth about the climate situation, at least not (available) for us human beings. The simple fact that the respondents in the study were so varied about this topic illustrates this very clearly. My point is nevertheless that these beliefs are important to the degree that they do have effectual consequences – both personal and political.[49]

7.1.1 Group more important than nationality

What appeared as the most striking result of the empirical research was that the Norwegian and German interviewees were tending to have the same opinions, values, arguments and beliefs about CC according to their working institution, here exemplified through their group belonging. In sum, group and sector belonging was more important for the interviewees' CC perception than their nationality (see chapter 6). Even though there were variances within the groups (see chapter 7.1.2), this was the major tendency that could be identified in course of process of organising and analysing the material.

The fact that the perception of climate change could be analysed according to group rather to a nationality or public-private distinction was surprising and unexpected. It was also unexpected that employees within the public sector were sceptic towards the IPCC's predictions and the national climate/energy policy. As IPCC is the basis for the national climate policy and strategies, I expected that it was commonly accepted as a credible information source. Instead, the interviewees in the public/energy group proved to be largely critical towards the problem of CC. Their views were contrary to the views of both the public/environmental group and the private sector. The public/environmental group was the most idealistic and convinced that ambitious climate aims were possible to carry through. The interviewees in the private group shared the climate perceptions of the public/environmental group to a large degree as they believed that CC is a problem and expressed the necessity for action. The fact that employees within the same institution and in institutions with similar business and activity areas hold similar perceptions on certain topics correspond with the assumptions of institutional theory and earlier research findings on the energy sector (see

[49] By personal I mean behaviour in the private sphere, by political I mean structural measures developed and implemented by law or binding resolution.

chapter 2.2). Institutional theory opens up for analysing institutions as a collective acting coherently, which makes it possible to treat institutions as political actors. This thesis' main finding is that individuals within the same institutions and similar types of institutions have similar norms, interests and identities related to the topic of CC. Further, that the climate perceptions are approximately the same within the same groups in Norway and Germany. Thus, the distinction in perception of CC between the groups in my case study is more important than that between Norway and Germany. This is true even though Norway and Germany are quite different countries with very different energy systems and structures (see chapter 4). There are also remarkable disparities in their climate policies and abatement targets. The two countries are nevertheless similar in the respect that they both have a strong energy bureaucracy. Both the Norwegian and German energy sectors are characterised by close connection and extended interaction between state institutions and commercial enterprises (see chapter 5). The findings from my empirical study seem to implicate that the culture within the public energy segments is more important for their member's perceptions than the national policies.

7.1.2 Varieties within groups

I have argued that the main differences were those between the groups. It would nevertheless be wrong to treat each group as one unified voice. When I speak about the perceptions and opinions of each group, I mean the main tendency within the group. It is on the one side the concrete arguments that the majority of respondents in each group used to justify their opinion, but also whether the interviewees were optimistic or pessimistic towards the different topics in general. In some groups, there were notable discrepancies between the respondents. The interviewees in the public groups were not as unified as the interviewees in the private group. The most dispersed group was the Norwegian public/energy group, of which half of the respondents were sceptical about CC, and the other half said they believed in the general statements from the IPCC. The latter nevertheless stressed that they did not have the qualifications to judge the validity of the IPCC's predictions, and would therefore not say whether they believed they were realistic. They further did not believe it was possible to stabilise CO_2 emissions on the aspired 450 ppm[50] and hence mitigate CC unless there was a technological breakthrough or an immense natural catastrophe. In both respects, the "believers" within the Norwegian public/energy group opposed the public/environmental

[50] The quantified target of the IPCC in order to stabilise the global temperature increase at 2 degrees Celsius.

groups in both countries. Regardless of whether they trusted the IPCC or not, the respondents in the public/energy group expressed scepticism towards the possibility – and the efforts made – of reducing emissions nationally. Many of them were also very pessimistic about the global potential and chances to mitigate CC.

I have argued that the opinion of the public/environmental group was opposing that of the public/energy group with regard to the feasibility of the national climate policy's aims and measures. This is also a generalisation of the main tendency within each group. The *majority* of the public/environmental group were convinced that the emission reductions was possible with today's technology, but there were respondents in each country who doubted this because of time pressure and the quantity of the reduction aims. I would still argue that it is reasonable to distinguish between the public/energy and public/environmental group. The reason is that the interviewees in the environmental groups all argued that it was positive and necessary to set ambitious aims – even though they did not believe that the aims would be possible to attain. One interviewee from the public/environmental group also started out as optimistic but turned pessimistic in course of the conversation. The respondents in the public/energy group combined pessimism towards emission reduction with scepticism toward the whole climate policy and /or topic in general.

The private group was the most unified. The Norwegian private group showed small variations in terms of degree of worry and in their characterisation of the climate policy. The majority of this group expressed that they thought the prognoses are conservative, because they hear from other sources that the development in reality is going faster. But there was also one (Ted) who neutrally stated that he holds IPCCs prognoses to be credible and that he had no qualifications to judge whether they are conservative or not. Those who believed IPCC's prognoses to be conservative were more worried and expressed larger dissatisfaction with the national climate policy than Ted. The private group varied most notably in terms of what strategies the companies were heading at. This distinction could be identified between the countries, and will be accounted for in the following section.

7.1.3 Varieties between Norway and Germany

Some differences in climate perception between the two countries could be identified. In this section, I elaborate on the issues that were objects of the main discrepancies between Norway and Germany. These are the worry category, strategies of the private sector and the fact that some of the German respondents talked about CC in a system context.

Worry

The most striking difference between Norwegians and Germans in all groups was that the Norwegians who took CC seriously expressed severe concern about its consequences. In Germany, there were very few who said that they were personally worried. This applies to both those who consider CC as a problem, and those who do not. Only three out of ten Germans expressed that "what climate change globally might bring" made them worried. Several of the German interviewees laughed as the question "*Do you worry?*" came up. "For me personally? Oh no, not at all!" some of them replied. The most important reason for not worrying was that the Germans were much more convinced that CC will not affect them physically where they live. Many of the German respondents argued that in general, the Germans find climate change great because of the warmer weather. Some of the respondents did not worry because of their perception of man's way of coping with problems. As Simon put it: "Man is so innovative that he will always find answers to such new challenges. He may have to ready to leave beloved things behind and make some sacrifices, but he will manage to survive." Michael also used evolutionary arguments to state the reason why he did not fear climate change:

> My attitude is that we humans are evolutionary beings. If the environment changes the human beings have to adapt. The ones who do not will have to die; it is a process of selection. Either I evolve further as human being and learn that some things are impossible to stop and then I will more or less be able to get along.

This was different in Norway. The Norwegian respondents that perceived CC as a problem also express serious worry. Thomas argued that "it can run out of control, and the world may become totally different". In contrast to the Germans, they mentioned that they also worry about the consequences of rising temperatures where they live and about the future for their children. It is interesting that the Germans are less worried than the Norwegians. According to IPCC's predictions, Norway is not supposed to fare worse than Germany with respect to the consequences of climate change (see chapter 4.2). In terms of political action, the German climate policy is more comprehensive than the Norwegian which might implicate that the Germans perceive the problem as more serious than the Norwegians. Germany has a considerable environmental movement and is famous for its environmental consciousness. The German Green Party was represented in the Government from 1998-2005, and Germany was therefore the first country in the world with an influential Green Party. The Norwegians are on their side also famous as a "nature people". Wilderness life and outdoor activities is regarded as part of the Norwegian folk spirit – even though wilderness tourism first started in

the end of the 19th century. Grenstad et al. (2006) nevertheless argue that the golden age of environmentalism in Norway was the years 1970 to 1975, when the Norwegian environmental movement was claimed to be the strongest in Europe. After that, member numbers and engagement have varied with the field's position/role on the agenda. The Norwegian environmental movement has nevertheless criticised the Norwegian Government for presenting itself as very environmental friendly abroad, whereas it is not very good at carrying through sufficient measures at home. Because of Norway's geographical conditions, the Norwegians have always been very exposed to weather (and climate), and Norwegians are in general much occupied with the weather. In 2006, two world champion cross country skiers founded the climate organisation "hvit vinter" (white winter), whose main objective was to secure the future skiing conditions in Norway. Almost all Norwegian interviewees mentioned that it would be a pity if it will not be possible to go skiing in the future.

Different degrees of worry may nevertheless not only be a result of the diverging expectations of climate change's effectual consequences. It may also be connected to the conditions under which Germans and Norwegians are living. Even though both countries are affluent industrial countries, there is be little doubt about that the Germans have been enduring far more hardship than the Norwegians the past 100 years. Both World Wars, which left Germany in ruins 1945, and the following cold war when Germany was squeezed between the fronts of the USSR and the USA, affected Germany to a totally different degree than Norway. Compared to these threats and catastrophes, the threat of climate change may appear insignificantly small, at least in terms of changed weather patterns. This may also be the reason why the German interviewees emphasised that climate policy is peace policy interviewees to a larger degree than the Norwegian. Many of the Germans said they did not fear climate change in itself, but the consequences it may have.[51] As Simon from the private group put it; "The most important aspect of it is our peace. All kind of climate policy must hence take justice of distribution into consideration."

Another explanation for discrepancies in degree of worry between Norway and Germany can be connected to the gender distribution of my sample. The research sample was gathered exclusively based on the interviewees' expertise and position in the institution. Because I chose the persons according to their professional positions, I did not have the

[51] It is, of course, difficult to distinguish between the fear of CC in itself and its consequences, as climate change *is* its consequences. This was nevertheless how the interviewees expressed themselves, and I think one must understand it as the division between a changed natural environment and the social consequences here above all related to political instabilities.

possibility to balance the men-women ratio. This resulted in a very different gender mix in the two countries. In Norway, the interviewees were half men and half women, whereas in Germany I only interviewed one woman. This side effect may to a certain degree reflect the gender situation in both countries. The Norwegian state has played an active role in integrating women in the working life, and has achieved one of the highest rates of female employment in the world together with Denmark and Sweden. The policy was closely connected to the development of a comprehensive welfare state. I will not account for this development within the frames of this thesis.

The unequal gender distribution may nevertheless have implications for the fact that the Norwegians were more worried than the Germans. Previous research has found that women are more convinced that climate change is occurring and feels threatened about it (Weber 2008). In my sample, all women said that they considered IPCC as a serious research panel. Four out of five Norwegian women clearly answered "yes, I am" on the question whether they were worried about climate change. The four Norwegian women who said that they worry were all mentioning the future of their children as a matter of concern. This also corresponds with results from earlier studies which have shown that women and respondents with many children fear an increase in extreme weather phenomena the most (Weber 2008).

It is also striking that all interviewees in the Norwegian environmental group were women. I will not speculate about whether these interviewees were *climate believers* because they were women or because of their institutional belonging – or both. But it may be the case that women apply for jobs in environmentalist institutions because of their environmental consciousness. This would support the recruiting hypothesis that the institutions hold different norms, values and beliefs because of the type of persons who wants to work there. I elaborate on this in chapter 7.4.1.

The strategies of the private sector

Another area where Germany and Norway divert from each other was how private companies reacted upon CC. Except for smaller variations within the country as well, the main difference was that most of the Norwegians combined business measures with measures on the workplace, in contrast to the Germans that focused on measures within their core activities; energy production. The German private group claimed that what they do in the sphere of production has far larger consequences than how they travel or heat their offices. Therefore, their focus is on the former. "What cars we drive is [a topic] for the media - for us, it has *nothing* to do with climate protection. For other companies this is different, but this holds for

the energy industry in generally" (Peter). The Norwegian companies do not agree with this: "Even though the effect is much larger when you do something in your production, it does not allow you to neglect what you do in your office" (Elisa). The Norwegians described different measures that their company has undertaken within office and administration activities.
On the other hand, the Germans told me that CC was a very important and widely debated topic within the firm, and I was given the impression that this was a top-down strategy, as it was an aim of the management that the employees were thoroughly informed on the topic: "The climate discussion that takes place in our company is very well-founded" (Simon). In Norway, not all the firms had corresponding agendas for informing employees about climate related topics, and one respondent described their effort as insufficient.

One explanation for these discrepancies may be that the German companies are exposed to criticism to a larger degree than the Norwegian in this respect. The German energy companies present in my sample have hard coal, lignite and/or nuclear energy production as their core activity. In Norway, the sample was composed of hydropower and oil producers. The environmental movement in Germany has termed the coal and lignite power plants "Klimakiller"[52], and there have been several cases where activists have occupied sites of construction for new power plants. The German energy companies have also met extensive critique for their lobby activity towards the bureaucracy and for their dominance over the German power grid (see chapter 5). The German employees are therefore subject to substantial pressure, and have to be prepared to meet criticism from several directions. In Norway, there has also been resistance against the building of new gas power plants[53], and Norwegian involvement in the construction of large scale dams for hydropower production abroad has been criticised both nationally and abroad[54]. I have not conducted a systematic comparison of the opposition against the energy business in Norway and Germany. The over mentioned factors would nevertheless implicate that the German energy sector is more unpopular than the Norwegian. It is probably also connected to the fact that the Norwegian hydropower activity is less a climate issue than coal and lignite based energy production in Germany.

The Germans and the System

During some of the interviews, topics or aspects of the climate change situation came up that were not addressed directly in my interview guide. This was intended and a result of my

[52] http://www.bund.net/bundnet/themen_und_projekte/klima_energie/wettbewerb_prima_klima/
[53] http://www.nu.no/oss/historie/
[54] www.fivas.org

choice of a semi-structured interview guide in order to shed light on as many aspects of the climate perception as possible. It nevertheless has the consequence that all interviewees did not receive the same questions. Some of the interviewees were telling a lot more compared to others who were either in short of time or very restrictive in their utterances. The question of political and societal system was one such topic. I mention this because I think it was interesting that several of the German respondents brought up this aspect.

Three of the German interviewees, all from the public sector, brought up the need or possibility for a change in the societal system. George argued that it was impossible to say anything about the consequences of climate change for Germany, because it depends on what economic situation we will have in Germany and the World in the future. George was certain that the current system will change:

> One day or another, the system is going to change. Therefore, we have to relate the natural changes to a system, which we do not know at all what will look like. […] As I assume that the changes will occur at a time when many of our society's boundary conditions have changed, it is impossible to foresee the natural consequences of climate change, in my opinion."

Bill and Paulina both argued that the capitalist system was part of the problem. According to the German economist Altvater (2005) is capitalism based on growth which can only continue with increasing energy consumption. Neither Bill nor Paulina presented other systems that would do better – on the contrary, Bill was eager to stress that socialist systems had not proven better in protecting the environment. They simply pointed out that to cope with the roots of the problem of CC, a change in political and economic system would be necessary. Bill predicted that new political systems would develop as a consequence of lacking energy resources.

None of the Norwegian interviewees were questioning the current political or economical system. A possible explanation the Germans brought up this topic could be that Germany's history is one of two different political systems. The importance of the current political system is probably more evident in Germany as the situation in East and West Germany was very different in 1990 – and certainly still is. The fact that the Germans has experienced such dramatic changes within short time has maybe contributed to increased awareness that political systems are not nature-given but a result of intended human action. The German sociologist Beck (1995) has described the contemporary environmental problems as not being solely an environmental problem, but a side effect of the modern society's ways of production: „The transformation of unexpected side effects of industrial production in the global ecological hot spots is *not* a problem of the environment – no so-called *environmental*

problem – but a profound institutional crisis in the industrial age of national states" (my translation).

7.2 Personal responsibility and behaviour

The second research question implies the investigation of climate perception's impact for personal behaviour. What perception each interviewee had of the individual's role and of personal responsibility and behaviour when it came to abating GHGs was largely influenced by what perception the person posited of the problem's character and gravity. As the latter varied immensely between the different groups (see chapter 6), I met correspondingly dispersed views on responsibility and comprehension of what they as individuals can and should do in their private lives.

As mentioned earlier, this topic is problematic to investigate. Its importance is also disputed. According to previous research (see chapter 3), lifestyles and consumption in private households are among the fastest growing causes for environmental damage and resource use. This suggests that it is necessary to elaborate more in-depth on the topic. In spite of the methodological problems connected to gathering data on personal behaviour accounted for in chapter 3, I experienced that I obtained substantial information about the interviewees' climate behaviour through their more or less comprehensive narratives. Their statements related to behaviour and responsibility also served to illuminate their climate perceptions further and reinforce the distinctions between the three groups of institutions.

One of the most interesting findings from the empirical study concerning personal responsibility was the answers from the public/environmental group. Even though I did not ask in detail about what each person did at home, most of the interviewees in the public/environmental group gave accounts for this. Many of them were eager to tell me about the many possibilities each person has, and argued that there is a large potential within this area. It was obvious that many of them had thought a lot about this topic. They all saw it as each individual's responsibility to do something, but shared the opinion that there are still many obstacles which has to be overcome within the energy system. One of them even claimed that personal behaviour is the main issue when it comes to mitigating CC. He was personally upset about the way everybody travels around the world without minding the climate, and claimed that he did not travel by plane himself for private reasons.

The findings from my field work implicate that climate consciousness and engagement among the respondents in the public/environmental group apparently do matter for how these persons behave and act. Many of them have succeeded in undertaking private emission

reductions. In my opinion, the fact that these respondents hold the perception that individuals can make a difference when it comes to coping with the problem is interesting in itself, as it opposes the "what I do personally does not matter anyway"-attitude presented in attitude B (see chapter 3). The findings also contrasts the main conclusion of Hovden's study (see chapter 3), which states that households with high environmental consciousness do not have a lower energy and resource use and hence a more environmentally friendly lifestyle. Hovden nevertheless acknowledges the importance of environmentalists' attitudes and engagement as necessary for the changing political structures into being more environmental friendly. This was also advocated for by respondents in the public/environmental group. Both Clara and Paulina claimed the individual's most important contribution to climate protection was through their voting behaviour. My findings nevertheless indicate that personal abatement effort is possible and can complement voting behaviour.

In contrast to the public/environmental group, the public/energy group was sceptical about allocating too much responsibility on the individual. First of all, the majority in the public/energy group claimed that individuals will not make the GHG emissions decline, either because it does not make any difference or because of man's nature (see below). Many of them expressed that they had always been using energy consciously. They therefore did not find it necessary to focus particularly on reducing GHG emissions. On the contrary, many of them found such an attitude rather ridiculous. Chris stated that he is not like the people from green communities who go by bike because of environmental reasons: "I go by bike of egoistic reasons because I want to stir myself to keep healthy".

The private group was somewhere in between. These respondents were obviously more concerned with climate change in their daily lives than the energy group. Most of them had reflected substantially on what they could do personally and undertaken some measures. They nevertheless expressed a less idealistic attitude than the environmental group, and were not as eager to tell about the individual's possibilities as the public/environmental group. The majority of the group promoted the point of view that even though each one of us has a responsibility, the main part lies with the political and social structures. The individual's role is rather to set a good example, but personal behaviour will not be sufficient to combat climate change.

7.2.1 Human nature

In some interviews, the questions concerning personal responsibility disclosed perceptions of human nature. Alex expressed that the reason why global emissions and energy consumption

would not decline, was because human beings always "want to maximise their self-interest". There was one question in my interview guide which asked if the interviewee could think of anything he would have done in his private life to reduce GHG emissions if he had more money. Alex replied that if he had more money he would probably not buy an energy efficient house, but "a bigger house, some more cottages (*hytter*) and the like". His answer was obviously ironic, but he argued that "this is they way it is, this is what people spend their money on". Eric said that "if you have the attitude that energy efficiency is necessary, I agree that in the end it will be the individual who makes sure that this happens. I just do not think that will happen. I suppose we humans are a little to far away from those things".

It would be very interesting to investigate the connection between perception of CC and the more basic perception of human nature, as the latter were apparently important explanatory factors for the respondents' intentional and actual behaviour in my case. To examine on this topic further is a large task and outside the scope of this thesis, as I have chosen to focus more on the historical and institutional aspects of the Norwegian and German energy sectors.

7.3 Public-private connections

Chapter 5 of this thesis is dedicated to the review of the historical development of the energy sector. This is in line with the idea of explanation-based theory, according to which social science only seeks regularities that are situated in specific contexts. In line with the assumptions of the theory of segmented state, I have investigated a tiny part of the energy segment in both countries. My empirical study endorses the point of view that the public/energy group and the public/environmental group can be regarded as different segments that stand in opposition to each other. This is also in line with the theory of segmented state, which states that the main dividing lines in politics goes between the different fields around which a segment emerges (Reitan & Stigen, 2001).

The account made in chapter 5 revealed that there has been close inter-linkages between state and industry actors in both Norway and Germany since the energy sectors' origin at the end of the 19th century. In both Norway and Germany, state institutions have for a long time not only co-operated with the energy companies, but been responsible for the sectors development. The state was also major shareholder in most of the energy companies. After a comprehensive liberalisation of the energy sector in both countries, and for Germany's case privatisation during the 1980s and 1990s, the state's role towards the energy companies was gradually reduced to that of indirect steering. In Norway, the large energy companies

operate as independent multinational companies despite continued state ownership, and the state's task has turned into that of being a stockholder. In one respect, state and market has thus separated compared to what was the case in the sector's origin. On the other hand, the account for the public-private co-operation in the Norwegian and German energy sectors disclose that state and industry representatives still meet in different forums on a more informal level. The communication between the two is apparently well nurtured. These findings would implicate that public and private actors belong to the same segment, as they share some basic values and perceptions and work towards the same aims.

The theory of the segmented state would therefore implicate coinciding perceptions of CC within public and private energy institutions. As showed in chapter 6, this is not the case. Instead, my empirical findings suggest that these institutions possess remarkable different climate perceptions when it comes to causes, consequences, mitigation possibilities, policies and worries. As mentioned, the respondents from the public/energy group were more sceptical about CC than the private sector, which had accepted CC as a serious problem. A possible explanation for this may be found in the strategy of business and industry actors in the climate negotiations accounted for above. Even though the private sector appears as climate believers in my empirical part, Vormedal's study argues that this has not always been the case. If one assumes that the public/energy and private group belong to the same segment, the public/energy group would probably have been highly influenced of the lobby activity working *against* climate regulation in the 1990s. Because of the inertia that characterises bureaucratic institutions (Weber 1978), it may be the case that the anti-climate mentality that dominated the energy segment before the Kyoto protocol was signed have remained within the public/energy group up to now. The fact that Torben from the Norwegian public/energy group mentioned that he used to be a climate sceptic would fit into such a theory. Torben told me that he had been sceptical about the predictions of climate change until short time ago. The reason he had changed his opinion was not the IPCC reports, but the fact that he observed that the weather patterns in Norway are changing.

The findings from chapter 5 indicated that parts of the private sector still lobby for and distribute attitudes in the climate's disfavour. If this is true, the climate scepticism within the public energy bureaucracy would not only be the repercussions of private sector's previous activity, but also the result of current influence.

7.4 Explaining distinct group features

I now enter further into the discussion of what might explain different aspects to the climate perceptions identified within the different groups. The explanations will be discussed group by group.

7.4.1 The public/environmental group

The climate perceptions within the public/environmental group were mainly in line with the official stand of Norwegian and German authorities. In this section, I discuss one possible explanation for why the public/environmental group was the group that was the least sceptical about CC.

Sharing view of the environmental movement

The interviewees from this group in both countries mainly argued in line with the spokesmen from the IPCC and the environmental movement. Even though the latter is composed of a diversity of organisations, which support different measures and different strategies, they largely work towards the same aims: stronger restrictions on GHG emissions, development of renewable energy, increased energy efficiency and eventually a structural change into a sustainable energy system. As accounted for in chapter 4.1, Norway and Germany are both characterised by comprehensive environmental movements.

The results from my empirical study reveal that the public environmental bureaucracy largely shares the argument and perspectives of the (political) environmental movements. One explanation for this may be the recruitment of employees into the public/environmental institutions. According to Gundersen (1991:22-23), there was a professionalisation of the Norwegian environmental movement in the 1970s, as environmental activists were recruited into a fast expanding public environmental bureaucracy.[55] This implies that the environmental field was co-opted early by the state (Grenstad et al. 2006:39). It also had the consequence that the environmental movement lost followers from the 1970s to the 1980s. A similar recruiting of staff from environmental organisation into Governmental bodies may be the case for Germany too, as their major public environmental institutions were founded in the same period.[56]

[55]The Norwegian Ministry of the Environment was founded in 1972 and the Norwegian Pollution Agency in 1974.

[56] The German Federal Environment Agency was established in 1974, and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety in 1986.

The connection between the environmental bureaucracy and non-Governmental organisations (NGO) was endorsed in my empirical study as several representatives from the public/environmental group stated that one of the most important things the individual could do "in the fight for the climate" was to become a member of either an environmental NGO or a political party and hence address the problem through political channels.

Reitan & Stigen (2001) point to the fact that the development of climate policy in Norway was characterised by conflicts between different parts of the public bureaucracy. This finding also supports the theory of the segmented state when the environmental and energy sector are perceived as opposing segments.

7.4.2 The Private Group

The private group was unified in their perception of CC as a serious problem. In this section I will discuss two possible explanations for this.

Corporate Social Responsibility

The notion of Corporate Social Responsibility (CSR) became increasingly important in the focus on sustainable development within the United Nation system. The concept emphasises that business are expected to account for social and ecological performance, and take such issues into account in business decisions and operations (WBCSD 2006). Because my empirical of varying climate perceptions between the public/energy and private group point in a different direction of previous research, which document extensive interaction between the two, it would be a tempting speculation to ask whether the "political correct" climate perception within the private sector in both countries is simply a result of the companies' public relation (PR)-strategies.

Many non-Governmental organisations (NGOs) have raised such critique of mainly multinational companies from different sectors. They argue that the CSR agenda with focus on corporate self-regulation is nothing but a PR-exercise and "green-washing" (Greer & Bruno 1996). To interpret my findings as such would imply that my interviewees in private sector were not telling the truth. I have no reason or intention to make such an assumption. My impression was on the contrary that the interviewees in the private sector were all seriously – and more or less idealistically – engaged in making their business more environmentally and climate friendly. This is also supported by Jelstad's findings from the study of Statoil's CRS strategy (See chapter 2.3). She argues that even though the company's environmental strategy was first of all a result of formal demands from the authorities,

internal pressure from employees was also a factor that made the Executive Board change its attitude. To find out to what extent the climate strategies of the private companies have had actual consequences is outside the frames of this thesis. As discussed in chapter 3, the respondents in the private group were persons engaged in climate and/or renewable energy policy issues in their respective companies, which may be crucial for their climate perceptions. Because some of the energy companies still earn their living on climate harmful activities, it may also be the case that some of their employees or their interest organisations still lobby in favour of these interests even though the company has accepted the issue of climate change as real. Ytreberg's journalism (see chapter 5.3.2) gives support to such an interpretation.

The role of business and industry in the climate negotiations

Vormedal (2008) and Greer & Bruno (1996) argue that the behaviour and strategy of the private sector can be explained with theories of profit maximising based on a rational choice calculations rather than with notions of values and norms within the firms. According to Vormedal, it is well documented that business has played an important role in the development of new agreements in the climate negotiations (Vormedal 2008:36). Vormedal has studied the role and influence of business and industry NGOs in the United Nations Framework Convention on Climate Change (UNFCCC). She found that business actors, organised in what she terms business and industry NGOs (BINGOs), changed their strategy from the early 1990s when the climate negotiations started, and to the turn of century when the Kyoto protocol had been signed and ratified.

The engagement of business and industry in the negotiations started out dominated by the fossil-fuel lobby, mainly organised through the Global Climate Coalition, which was an organisation advocating anti-mitigation and regulation. Its efforts to obstruct and delay the negotiations for a climate agreement are well documented (Vormedal 2008). By the beginning of the new millennium, the BINGO constituency had grown and diversified, and so had also its mandates and strategies. Starting out as being exclusively sceptical towards the problem of Climate Change per se, and thus working hard to sabotage the development of an international climate agreement, a considerable part of the business and industry lobby changed their motivation into being more or less pro-climate change. The Global Climate Coalition was disbanded in 2002 after several of its core members such as British Petroleum, Shell and General Motors left the organisation in the wake of the Kyoto protocol. The reason was that the companies felt they could no longer be associated with the organisation's aggressive anti-

climate stance. Today, the mandates and activities of BINGOs range from strong opposition to support and pro-regulation lobbyism. The motivation for this turn in climate change perception from the business point of view can be illustrated by this quotation from the secretariat of the World Business Council for Sustainable Development (WBCSD), a prominent BINGO that explicitly endorses the need for GHG regulation and international frameworks: "If you are a smart CEO[57] these days you will realise that climate change issues will have a big impact on your future business. So you might as well get involved right from the beginning. A lot of companies that are around today will not be around in 50 years, because they didn't manage to respond to a different economic environment which will be shaped by sustainable development issues."

The "greening" of business and industry, exemplified through their NGOs can hence be explained with the companies' rational risk calculations for changed market conditions in the future. In contrast to the public bureaucracy, the private companies have to think progressively and act innovative with regards to what might happen in the future in order to remain competitive. After the signing and ratification of the Kyoto protocol, the most rational strategy for the companies was to accept climate change as a problem. The expected change in market conditions consists not only of the consumers' and civil society's increasing demand for climate friendliness. It is first of all a question about the anticipated future market regulation. A rational strategy for business actors are hence to try to influence the development and design of future agreements and regulations so that it will be in accordance with their own activity and survival. Because the Kyoto protocol's main mechanisms are market based[58], business and industry actors have come to play an important role as advisers when new climate negotiations and its regulation systems are designed. Business and industry – for-profit organisations – are hence above all acting in line with strict profit maximising logic, best explained by rational choice theory's conception of social actors as rationally calculating actors that strive to maximise their own utility.

7.4.3 The public/energy group

The public/energy group was the group that most notably stood out from the other groups. As mentioned above, this group drew the issue of CC in doubt. I now discuss two possible explanations for that.

[57] Chief Executive Officer
[58] The main mechanisms of the Kyoto protocol are the Emission Trading Scheme, Joint Implementation and the Clean Development Mechanism.

Dissatisfaction with climate policy

The main reasons for disagreement were that the interviewees in the public/energy group – either partly or fully found that the climate policy was 1) unnecessary – because climate change is not a problem or the problem is not *that* serious 2) useless because it does not make any difference in a global perspective anyway 3) over-expensive 4) arbitrary because it does not follow a co-ordinated and reasonable plan, and 5) populist as it focuses on particular – and often insignificant measures – which gains a lot of attention in the media.

The findings implicate that there may be a socialisation effect of belonging to the public/energy group, which is similar in Norway and Germany and hence independent of the countries' different energy profiles. This may be related to the position of the energy bureaucracy in both countries and its importance for the national economy (see chapter 5). The energy bureaucracy is old compared to the environmental bureaucracy and characterised by strong hierarchical structures. The closeness to industry actors accounted for in chapter 5 and 7.2 may also be factors explaining the conservativeness of the energy bureaucracy. It is important here to repeat that I cannot conclude anything on the basis of my limited sample. The climate scepticism within the energy bureaucracy could be an interesting hypothesis for further investigation.

The character of the problem

Another possible explanation is linked to the nature and scope of the problem of climate change. Coping with CC means changing material structures and social perceptions, on all levels of governance and in a wide range of forums; private as well as public, political as well as civil. When one looks at the diverging opinions about the feasibility stopping climate change, it is clear that the challenges connected to this task are immense.

Many of the interviewees in the public/energy group were people that are responsible for executing the energy policy passed by the politicians. Some are in charge of the implementation of new and amended laws, and they are experts within their working field. In this regard, they have first hand knowledge about the difficulties connected to the achievement of the national aims of emission reductions, because they actually have to find out how specific reductions are to be carried through. Many of the respondents from the public/energy group in both countries express that achieving the policy aims would mean vast interventions in the society. They foresee that such a policy will become very expensive and also influence other parts of the society – above all different parts of the industry – to such a degree that they doubt the population will accept it/agree upon it. This may therefore be an

alternative or additional explanation for why this group is less convinced about IPCC's predictions. If the situation really is to become as bad as the IPCC foresee, it may be very difficult and tiring to be daily confronted with the impossibility of preventing it. There is much research that implies that individuals distance themselves from certain information to maintain coherent meaning systems (Gecas & Burke, 1995 in Norgaard (2003)). The "denial" of the problem among the energy policy experts would be in line with the perspectival selectivity that Norgaard found in her study of how lay people in Norway were coping with CC (see 2.1.1). Norgaard argues that Norwegian economic prosperity and way of life is intimately tied to the production of oil. She therefore identifies the ignorance of the issue of CC as a collectively organised denial which serves to maintain Norwegian global economic interests and perpetuate global environmental injustice. Altvater extends this hypothesis and perceives the economic prosperity of the entire industrialised part of the world as tied to the production and combustion of fossil and nuclear fuels (Altvater 2005). Both Germany and Norway are enjoying remarkable wealth in a global perspective through activities that causes huge GHG emissions. The petroleum production in Norway has made national stabilisation of CO_2 emissions next to impossible (Hovden and Lindseth (2002) in Norgaard (2006)). If one accepts Norgaard's and Altvater's arguments, one could interpret the rejection of perceiving CC as anthropocentric and IPCC's credibility as necessary for the respondents in the public/energy group to be able to continue their professional activity as usual.

8 Conclusion

This thesis has investigated perceptions of climate change among leaders in the Norwegian and German energy sector, and the relationship between climate perceptions and personal behaviour. Climate change (CC) is a huge topic that affects many parts of the society. It is as much a societal as a natural problem. The contextual parts of this thesis have contributed to illustrate the importance of the energy sector in the effort to cope with CC. Norway and Germany show considerable differences in the organisation of their energy structures and have to meet the reduction obligations with different strategies. However, it is true for both countries that public authorities have an important task to develop favourable framework conditions if comprehensive emission reductions shall become feasible. The historical review of public-private inter-linkages in both countries' energy sectors made clear that the contemporary design of the energy sector is to a large extent a result of the role of public authorities. The choice of comprehensive state presence in the energy sector was an intended political decision, and the mentality behind German Energy Industry Law of 1935, which stated that "the consumption of energy is in the interest of the common welfare and to avoid damaging economic effects of competition", has been the dominating in the Norwegian development as well.

The first research question aimed at investigating climate perceptions among leaders in Norwegian and German energy sector. The empirical study carried out in this thesis shows that there is no uniform perception either of the threat of climate change or of its solutions. One major finding was that the respondents' climate perceptions could be organised according to the *type* of energy institution they worked at. The same was true for the second research question, which investigated the relation between climate perception and personal behaviour. Starting out with a research design and methodology that emphasised the personal aspect of climate change on the micro level, the thesis' main findings are hence of a macro character as they stress the importance of political structures and institutional cultures. This is as much a result of the thesis' exploratory research design as of the empirical findings themselves.

8.1 Drawing on institutional theory

The thesis has presented and related itself to several theoretical positions, of which explanation-based and institutional theory were the most important. Explanation-based theory emphasises that social phenomena should be analysed in their context. Chapter four and five

were therefore dedicated to two macro level context chapters. The former accounted for national energy and climate polices and illustrated the challenges connected to reduction of GHG both nationally and globally. Both Norway and Germany are facing the problem of CC with national climate policies. However, the German policy is much more ambitious than the Norwegian, above all in respect of development of renewable energy and energy efficiency, despite the fact that Norway's potential for development of RES is alleged to be much bigger than Germany's. Chapter five was dedicated to the third research question and endeavoured at giving an account of inter-linkages between public and private actors in the energy sector since the sectors origin in the 19th century up to current date. The main contributions of this chapter were firstly, to illustrate that the state has played a crucial role for the historical development of Germany and Norway's energy sector and secondly, to shed light on the high degree of cooperation between public and private actors within the sector. Both contributions give support to institutional theory. The first contribution points to the fact that institutions matter in the making of policy. The second may serve as an illustration of the Norwegian branch of institutional theory occupied with policy networks, i.e. the theory of segmented state, where a segment is defined as the field of actors which emerges around a specific type of industry policy or function. The close cooperation between state and industry actors in the energy sector accounted for in chapter five indicates that these actors belong to the same segment.

Institutional theory might also explain the most striking result from the thesis' empirical study. By taking on an institutional approach, one regards institutions as arenas for contending social forces, and as collections of standard operating procedures and structures that define and defend values, norms, interests, identities and beliefs. This could explain the fact that the interviewees' climate perceptions varied according to institutional – exemplified by group – belonging. On the other hand, the empirical findings divert from the assumption of the segmented state, as the public/energy and private group represented opposing climate perceptions. One possible explanation for this may be the role of business and industry in the climate negotiations. Previous research has shown that private actors turned from being climate sceptical and lobbying against the creation of binding negotiations into being pro-climate after the signing of the Kyoto protocol.

8.2 Huge variations in climate perceptions

There were several interesting results from the empirical study. First of all, there were larger differences between climate perceptions between institutions than between the two countries,

despite the fact that Norway and Germany differ largely in respect of their energy systems and of their climate policies. In order to maintain the demand for anonymity, the institutions represented in the sample were divided into three groups, according to which the findings were analysed. The groups were called the public/energy, public/environmental and the private group. The first consisted of institutions mainly occupied with what I call traditional energy, defined as fossil, nuclear and large scale hydro energy. The second group consisted of institutions whose area of responsibility is also energy production, but directed towards the development of renewable energy. The private group consisted of private energy companies, whose core business activity is traditional energy production.

The interviewees from the public/energy group stood out as partly or completely sceptical towards the scientific community's prognoses and publications on CC.[59] Some of them doubted the current findings of the dominating climate research, and argued that they did not believe that CC is happening because of human activity or that it will be as bad as the researchers predict. The public/energy group was very pessimistic about the potential for attaining the national emission reduction aims, and critical towards the current climate policy in their respective countries. Because most members of the public/energy group did not believe in the malignity of CC, they did not worry about CC personally. Nor did they see the need for undertaking measures to reduce personal impact on global CC. The prevailing opinions was rather that a) it did not matter what they did personally anyway because of the scope of the problem, b) it was useless to address personal responsibility because most people just want to maximise their own utility and/or c) they did not know what they could do themselves to become more climate friendly.

In contrast to the public/energy group, the public/environmental group was unified in their perception of CC as a huge and serious problem. They expressed their worry and gave detailed explanations on how each individual could reduce the emission of GHG and what they had done themselves in this area. They were also convinced that even though national climate and energy policies are ambitious, they are feasible and necessary. Many of them pointed to the responsibility industrial countries have to reduce emissions nationally, and expressed the attitude that we "have to take our turn" in order to be credible and also to stand out as a good example for the international community.

The private group was the group that showed the largest differences between Norway and Germany. The Norwegians in this group were far more concerned about the problem than

[59] Exemplified by the IPCC's 4th assessment report (IPCC 2007a).

the Germans, who hardly feared CC personally at all. However the members of the private group shared the general opinion that CC is a problem and represents a huge challenge for our society, according to which their companies react with more or less comprehensive strategies. The interviewees in this group were not as idealistic about efforts to reduce GHG emissions in their private life as the public/environmental group, but they had either undertaken some measures or were considering it.

8.3 Implications of the findings

The motivation behind the thesis' research questions was illustrated by the two attitudes discussed in chapter three: A) Many people will not take action to reduce GHG emissions personally because they regard it the responsibility of state and industry actors and B) "What I do does not matter for the climate anyway". It was certainly the case that these attitudes could be identified among a considerable part of the sample.

Attitude B was the dominating opinion among the interviews in the public/energy group. As discussed in chapter three, Hardin (1968) points at how this attitude may contribute to the destruction of a public good. Attitude A serves to emphasise the importance of the political action further, as it illustrates that political actors not only are responsible for policy making, but serve as a model for the population. When the institutional culture within parts of the public energy bureaucracy is sceptical about climate change, this *might* represent an obstacle for a comprehensive change in the current energy systems into a more "climate friendly" one.

The review of Norwegian and German official climate policies nevertheless shows that the German policy for developing RES is more ambitious than the Norwegian. One could therefore say that the climate scepticism identified within parts of the German bureaucracy *does not* obstruct the RES policy. I would nevertheless argue that such an interpretation would be wrong. The RES development is only one part of Germany's combined energy and climate policy. The future – and even more ambitious – reduction targets will include interventions in a much wider range of areas within energy policy. The German interviewees within the public/energy group argued that it will not be possible to carry out such comprehensive emission reductions. Following institutional theory, which asserts the importance of institutions in the making of policy, it might be expected that it will be very difficult to achieve the prescribed goals if reluctance against them persists within the public institutions.

8.4 Concluding remarks

According to Schreyer & Mez (2008), the barriers for developing RES are manifold and well documented. In their study about the feasibility of establishing a European Society for Renewable Energy, they claim that the obstacles are of economic, technical as well as administrative character. Among the most important challenges are the competitiveness of RES, the problems connected to storing renewably produced energy and comprehensive bureaucratic procedures. The findings of this thesis nevertheless suggest that parts of the energy bureaucracy are rather sceptical about CC per se and climate policy aims and measures. The historical review made in chapter five illustrated that the state has played a central role in the energy sectors' development in both countries. In Norway, this is true especially for the development of hydropower plants, transmission grids and investment in the petroleum sector. In Germany, public funding has been crucial for the maintenance of hard coal production and the introduction of new technologies like nuclear power and in recent years; new renewable energy sources. The successful development of RES in Germany serves an example about the importance of favourable public policy conditions.

Institutional theory stresses the importance of institutions within the making of politics as they see policies as conspicuously influenced by the institutional structure within which policies occurs. If this assumption is accepted, the sceptical climate perceptions identified among individuals within the public/energy institutions *may* be an additional point in Schreyer & Mez' account of barriers for development of RES.

This has been an exploratory study, with few interviews and limited scope for generalisation. To investigate whether its findings are valid for the institutions in general – and the extent to which they represents an obstacle for a change into a renewable energy system – would require further and more comprehensive research on the topic.

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All references used in the thesis are listed.

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Appendix A: Interview guide

National level

1. What do you think about the last prognoses from the scientists of the IPCC?
2. What do you think will be the consequences of CC for Germany/Norway (dependent on whether the interviewee was German or Norwegian). (Consequences for the natural environment and the society were added if necessary.)
3. What do you think about the German/Norwegian Government's current climate policy?
4. How do you consider the chances of the German/Norwegian society to reduce its emissions with 40% (Germany) or 20% (Norway) within 2020?
5. Do you think the Government's GHG emission reduction targets are reasonable in relation to the anticipated threat of CC?
6. What do you think about the adopted measures of the Government in relation to the reduction targets?
7. What will the energy mix in Germany/Norway look like in 2030?

Corporate level

8. Is there a program or strategy in your institution to inform the employees about CC – for example to invite scientists, arrange conferences and others?
9. Does your institution have a program or strategy to facilitate and encourage climate protection on the work place?

Personal level

10. In the debate about CC it is often discussed who has the responsibility to mitigate CC. How much responsibility would you say each individual has in order to reduce GHG emissions?
11. TIME Magazine had last year (April 2006) a cover page with the headline: "Be worried. Be very worried." Would you say that you worry about CC? Or feel threatened by it?
12. (eventually) What do you think about the public debate about CC?
13. What changes will climate change bring about in your personal life?
14. Do you think people in your surroundings have changed their behaviour because of the threat of CC? How?
15. Have you changed anything yourself?
16. Is there anything you would have done in order to reduce emissions in your personal life if you had more financial resources available?
17. Would you be prepared to abstain from anything out of consideration for the climate? Under what conditions?
18. What are in your opinion the largest obstacles for mitigating CC?

Appendix B: The TIME Magazine cover page, April 2006